

**ANTONIO PARKWAY WIDENING PROJECT  
WATER QUALITY ASSESSMENT REPORT**

**Orange County, California**

**Federal Project FTPL-5955 (071)**

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## LIST OF ACRONYMS AND ABBREVIATIONS

<b>ACOE</b>	Army Corps of Engineers
<b>amsl</b>	above mean sea level
<b>Basin Plan</b>	Water Quality Control Plan for the San Diego Basin (9)
<b>BAT</b>	Best Available Technology
<b>BCT</b>	Best Conventional Pollutant Control Technology
<b>BMPs</b>	Best Management Practices
<b>CMF</b>	Cartridge Media Filter
<b>CDFG</b>	California Department of Fish and Game
<b>CEQA</b>	California Environmental Quality Act
<b>cfs</b>	cubic feet per second
<b>CWA</b>	Clean Water Act
<b>Department</b>	California Department of Transportation
<b>EA</b>	Environmental Assessment
<b>EPA</b>	United States Environmental Protection Agency
<b>FHWA</b>	Federal Highway Administration
<b>MEP</b>	Maximum Extent Practicable
<b>mg/L</b>	milligrams per liter
<b>ug/L</b>	micrograms per liter
<b>MUN</b>	Municipal and Domestic Supply
<b>NEPA</b>	National Environmental Policy Act
<b>NPDES</b>	National Pollutant Discharge Elimination System
<b>NTU</b>	Nephelometric Turbidity Units
<b>OCTA</b>	Orange County Transportation Authority
<b>OCWD</b>	Orange County Water District
<b>REC-1</b>	Contact Water Recreation
<b>REC-2</b>	Non-contact Water Recreation
<b>RWQCB</b>	Regional Water Quality Control Board
<b>SR</b>	State Route
<b>SWMP</b>	Stormwater Management Plan

<b>SWPPP</b>	Stormwater Pollution Prevention Plan
<b>SWRCB</b>	State Water Resources Control Board
<b>TMDL</b>	Total Maximum Daily Load
<b>WARM</b>	Warm Freshwater Habitat
<b>WDR</b>	Waste Discharge Requirements
<b>WILD</b>	Wildlife Habitat
<b>WoUS</b>	Waters of the United States
<b>WQAR</b>	Water Quality Assessment Report

## EXECUTIVE SUMMARY

The Antonio Parkway Widening Project (Project) is located in southern Orange County near the City of San Juan Capistrano. The project proposes to widen the existing Antonio Parkway for an approximate 1.4-mile segment within unincorporated Orange County, California. The project limits begin at approximately 2,000 feet south of the intersection of Covenant Hills Drive (the southern boundary of the Ladera Ranch Planned Community) and extend approximately 7,900 feet (1.4 miles) south. This would extend the improvements approximately 900 feet south of the intersection with State Route 74 (SR-74). The typical proposed roadway width would be 102 feet between curbs and a total of 120 feet of roadway right-of-way (ROW). A new 40.25-foot-wide bridge would be constructed over San Juan Creek. The new bridge, combined and joined with the existing bridge, would provide sufficient width to allow for three southbound lanes, one southbound left turn lane, a four-foot-wide raised median, and three northbound lanes. The purpose of this document is to address the potential adverse impacts of the proposed project and to recommend control measures to avoid and minimize adverse impacts to water resources.

Runoff from the proposed project would enter lower San Juan Creek which is located mainly in southern Orange County, California. The watershed encompasses a drainage area of approximately 176 square miles. The headwaters of San Juan Creek are located in Cleveland National Forest in the Santa Ana Mountains and the creek drains southwesterly to the Pacific Ocean at Doheny State Beach, near Dana Point Harbor. The lower portion of San Juan Creek was also listed for a legacy pesticide (DDE is a break down product of DDT) in the 2006 303(d) List. The updated 2008 303(d) list, the Clean Water Act Sections 303(d) and 305(b) Integrated Report for the San Diego Region, was approved by the San Diego Regional board on December 16, 2009. The Integrated Report was submitted to the State Water Resources Control Board (State Board) and is awaiting approval. The 2008 303(d) list adds Diazinon, Phosphorus, Selenium, Total Nitrogen as N, and Toxicity for San Juan Creek.

Potential impacts to water quality may be temporary impacts associated with construction of the proposed project, and permanent impacts associated with the operation of the project. Construction related impacts may include discharges of sediment and sediment associated pollutants, increased turbidity, and increased organics that could lead to depressed dissolved oxygen levels. During construction, equipment operation and maintenance could also result in spills of lubricants and fuels which can be toxic to aquatic organisms. Post construction impacts are associated with the vehicle sources of pollutants including heavy metals, hydrocarbons, sediment, and trash and debris.

The development of the overall program including this Project involved extensive coordination with a number of agencies including the US Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG) on the Natural

Community Conservation Plan and Habitat Conservation Plan (NCCP/HCP) and the US Army Corps of Engineers and CDFG on the Special Area Management Plan (SAMP) and Master Streambed Alteration Agreement (SAMP/MSAA). The development of the water quality management plan involved the participation of Orange County and the Regional Water Quality Control Board, San Diego Region.

Permit requirements include compliance with the County of Orange NPDES Permit and Drainage Area Master Plan, the State of California Construction General Permit, the Clean Water Act Section 303(d) requirements, and the Waste Discharge Requirements and Clean Water Act Section 401 Water Quality Certification (Order No. R9-2006-0104) issued by the San Diego RWQCB to Rancho Mission Viejo Community Development, LLC for the Ranch Mission Viejo Ranch Planning Area 1 project on October 16, 2006.

It is recommended that runoff from the new impervious area of Antonio Parkway from the Ladera Ranch Planned Community boundary south to the northern terminus of the San Juan Creek Bridge be treated by cartridge media filtration (or an equivalent proprietary Best Management Practice [BMP]). The cartridge media filtration system would be appropriately sized to treat the project runoff. It is recommended that the runoff from the new Antonio Parkway Bridge, Antonio Parkway south of the bridge to State Route 74 (SR-74), and the small area of La Pata Avenue south of SR-74 would be treated in the proposed water quality basin that would be constructed with development in the northeastern corner of the Antonio Parkway and SR-74 intersection. For the construction phase of the project, a storm water pollution prevention plan (SWPPP) would be developed consistent with the recommendations herein including erosion and sediment control, non-storm water discharges, waste materials management, training, and inspection. For post construction, routine and major maintenance activities are summarized.



## **1. INTRODUCTION**

This Water Quality Assessment Report (WQAR) analyzes the project specific water quality impacts to the immediate/adjacent area to the Project and the water quality control measures that are recommended to avoid or minimize these impacts. This chapter describes the Project and alternatives, as well as an overview of the water quality assessment used to evaluate the potential impacts related to project implementation.

### **1.1 Project Description**

The Project is located in southern Orange County near the City of San Juan Capistrano (Figure 1-1). Antonio Parkway is located approximately 2.5 miles east of Interstate 5 (I-5) and provides the only direct route between the communities of Ladera Ranch, Mission Viejo, and Rancho Santa Margarita. At State Route 74 (SR-74), the name of the roadway changes to La Pata Avenue, which extends to the south and currently terminates at the Prima Deshecha Landfill.

The project proposes to widen the existing Antonio Parkway for an approximate 1.4-mile segment within unincorporated Orange County, California. The Project limits begin at approximately 2,000 feet south of the intersection at Covenant Hills Drive (the southern boundary of the Ladera Ranch Planned Community) and extend approximately 7,900 feet (1.4 miles) south (Figure 1-2). This would extend the improvements approximately 900 feet south of the intersection with SR-74, which is known locally at Ortega Highway. This extension would require a new 40.25-foot-wide bridge be constructed over San Juan Creek.

Antonio Parkway has been constructed to the full standard to the southern boundary of the Ladera Ranch Planned Community; it is a four-lane roadway from the Ladera Ranch Planned Community southern boundary to SR-74. The bridge across San Juan Creek was built as part of the initial phase of improvements associated with the Ladera Ranch Planned Community and is 68 feet wide. Though only interim improvements were constructed within the study area, the ultimate right-of-way was graded from the southern boundary of Ladera Ranch to the San Juan Creek Bridge with initial phase of construction in 1998.

The purpose of the proposed project is to (1) provide sufficient transportation infrastructure to meet the long-term travel demand for southeastern Orange County, (2)

provide improvements consistent with planning programs, including the Orange County Master Plan of Arterial Highways and the County of Orange Transportation Element, and (3) provide improvements to satisfy long term transportation demand planning for the region.

The project's need has been established through a number of previous studies. The roadway was originally designated on the County of Orange Transportation Element as a commuter highway with a "right-of-way reserve" designation for a major arterial highway. The "right-of-way reserve" designation is used when origin-destination needs have been identified but the ultimate capacity requirements have not been established. In 1995, the County of Orange conducted studies to establish a precise alignment and capacity requirements for Antonio Parkway. As a result of these studies, Antonio Parkway was designated as a major arterial highway, which is a six-lane, divided roadway with 120 feet of right-of-way. This need has been confirmed through subsequent studies conducted for the Ranch Plan, including FEIR 589.

#### **1.1.1 No Build Alternative (Alternative 1)**

The No Build Alternative would not provide any improvements to Antonio Parkway. The segment of the roadway from the southern boundary of the Ladera Ranch Planned Community to SR-74 would not be widened to full major arterial highway width.

#### **1.1.2 Build Alternative (Alternative 2)**

The project proposes to widen the existing Antonio Parkway for an approximate 1.4-mile segment within unincorporated Orange County, California. The Project limits begin at approximately 2,000 feet south of the intersection at Covenant Hills Drive (the southern boundary of the Ladera Ranch Planned Community) and extend approximately 7,900 feet (1.4 miles) south. This would extend the improvements approximately 900 feet south of the intersection with SR-74, which is known locally as Ortega Highway. Extending the improvements through the intersection is required to facilitate traffic operations and to provide for a safe transition to the existing lane configuration on La Pata Avenue. The improvements would utilize the existing roadway centerline, profile, and standard super elevation rates. Also, the Project will utilize ultimate grading that was included with the prior roadway construction project

### ***1.1.2.1 Roadway Geometrics***

The preliminary design concepts call for a typical proposed roadway width of 102 feet between curbs and a total of 120 feet of roadway right-of-way. This widening would allow for 3 lanes of traffic in each direction (13-foot, 12-foot, and 11-foot lanes) and a 14-foot-wide raised median. Additionally, 8-foot-wide bikeway/shoulders and a 6-foot-wide curb-adjacent or 5-foot-wide meandering sidewalks would be provided on both sides of the street. Parkways would vary between 11 and 25 feet in width. See Figures 1-3a through 1-3d for the preliminary design concepts for Standard Cross Sections that apply to the Project.

The preliminary design concept calls for a new 40.25-foot-wide bridge that would be constructed over San Juan Creek. The new bridge, combined and joined with the existing bridge, would provide sufficient width to allow for three southbound lanes, one southbound left-turn lane, a four-foot-wide raised median, and three northbound lanes. There would be eight-foot shoulders and five-foot sidewalks on both sides of the roadway. The preliminary design would require a cast-in-place, pre-stressed, continuous concrete box girder that would match the existing bridge superstructure. The proposed bridge span configuration would match the existing bridge spans and would be a total of 776 feet long. Figures 1-4a through 1-4h provide the preliminary Conceptual Project Plans.

At several locations, the preliminary concept calls for cross-sections for Antonio Parkway to be widened to accommodate turning lanes. These locations reflect approved land use plans. Turn lanes would be provided at the following locations:

- A left-turn lane and two right-turn lanes would be provided at the north leg of the intersection at SR-74 for the southbound direction.
- A northbound right-turn lane and southbound left-turn lane would be provided at “D” Street. This future roadway would be located south of the San Juan Creek Bridge and would provide access to a future commercial retail site for Tentative Tract No. 17054 on the northeastern corner of the SR-74/Antonio Parkway intersection. The raised median opening on Antonio Parkway at this location would be designed to allow only southbound left turn movements. Westbound left turns out of the parcel would be prohibited.
- Two southbound left-turn lanes and a northbound right turn lane would be provided at the future Cow Camp Road intersection.

- North of Cow Camp Road, the Antonio Parkway intersection at the future “C” Street would have two northbound through lanes with a single northbound shared through and right-turn lane. In the southbound direction it would have three through lanes and a right-turn lane. Left turn lanes would be provided for both the northbound and southbound directions.

South of SR-74, Antonio Parkway becomes La Pata Avenue. Improvements are currently under construction on SR-74 and affect the Antonio Parkway/La Pata Avenue/SR-74 intersection. As part of the Project, no modifications to SR-74, other than striping adjustments immediately north and south of the intersection would be necessary because the preliminary design for SR-74 has incorporated the ultimate cross-section for Antonio Parkway/La Pata Avenue. The Antonio Parkway cross-section immediately north of SR-74 would consist of:

- 6 southbound lanes (1 left-turn lane, 3 through lanes, and 2 right-turn lanes);
- A variable and approximate 24-foot-wide median;
- 3 northbound lanes;
- An 8-foot-wide shoulder on the northbound side, including provision for a bike lane;
- A 5-foot shoulder on the southbound side, including provision for a bike lane;
- A proposed 25-foot-wide parkway for the northbound side; and
- A 15-foot-wide parkway on the southbound side.

As previously indicated, the Project conceptual design would involve improvements to approximately 900 feet of La Pata Avenue to provide transition from the six-lane Antonio Parkway improvements to the existing configuration for La Pata Avenue. La Pata Avenue is designated as a Primary Arterial Highway. The standard Primary Arterial curb-to-curb width is 84 feet, with a total of a 100-foot-wide right-of-way. The improvements to La Pata Avenue would utilize the existing centerline. To provide for this transition and meet the operational requirements, La Pata Avenue immediately south of SR-74 would have three southbound lanes with a four-foot-wide median, two northbound left-turn lanes, three northbound through lanes, and a northbound right-turn lane. This project would match the existing La Pata Avenue profile and super-elevation rates.

Because turn lanes are proposed, which is beyond what was analyzed as part of the original project in 1995, additional right-of-way would be required to implement the

proposed project. The additional right-of-way would affect six parcels. The total area would be approximately 1.8 acres. Rancho Mission Viejo, LLC would dedicate the required right-of-way to the County.

#### ***1.1.2.2 Signal Improvements and Lighting***

No signal modifications, other than timing adjustments, would be required at the Antonio Parkway/SR-74/La Pata Avenue intersection because the ultimate signal requirements and placement will have been installed in conjunction with the ongoing SR-74 project. The signal improvements would ultimately be installed at the following intersections: Antonio Parkway/Cow Camp Road and at Antonio Parkway/“C” Street. However, the signal improvements would be phased into operation to meet traffic needs of arterial traffic with the adjacent development. Street lighting would be consistent with the County of Orange requirements for safety lighting.

#### ***1.1.2.3 Drainage and Water Quality***

Drainage improvements would be added for the proposed improvements. The tributary area to the existing storm drain will not change. The existing flow-by catch basins were sized based on preliminary 10-year peak flow rate estimates, and all sump catch basins were sized for a 25-year peak flow rates; all of which do not require modification. The flows on the western side of the roadway would be redistributed as ditches, and inlets would be replaced by gutters and catch basins.

Post-construction runoff from the new impervious area of Antonio Parkway from the Ladera Ranch Planned Community boundary south to the northern terminus of the San Juan Creek Bridge would be treated by cartridge media filtration (or an equivalent proprietary Best Management Practice [BMP]). The cartridge media filtration system would be appropriately sized to treat the project runoff.

The runoff from the new Antonio Parkway Bridge, Antonio Parkway south of the bridge to SR-74, and the small area of La Pata Avenue south of SR-74 would be treated in a proposed water quality basin that would be constructed with development in the northeastern corner of the Antonio Parkway and SR-74 intersection.

The existing San Juan Creek Bridge drains through deck inlets for direct discharge to San Juan Creek. Retrofitting the existing bridge deck with a storm drain system is not required with current water quality standards. Under the County’s Drainage Area Management Plan, retrofitting the existing bridge is not required because the percentage

increase in impervious surface is less than 50 percent of the amount of existing impervious area. Therefore, the County would not be required to treat runoff from the existing portion of the bridge.

#### ***1.1.2.4 Utilities***

Roadway design would require modification to several existing utilities or would require work within their easements. Modification may be necessary to allow for appropriate sizing of utilities to serve the approved development adjacent to the roadway. The following utility modifications would be required:

- Approval of grading in the Santa Margarita Water District (SMWD) easement;
- Approval of grading in the Capistrano Valley Water District (CVWD)/City of San Juan Capistrano easement;
- Relocation of existing San Diego Gas & Electric (SDG&E) utility lines; and
- Relocation of existing AT&T utility lines.

#### ***1.1.2.5 Grading Requirements***

From the southern boundary of Ladera Ranch to the bridge across San Juan Creek, the grading for the full six-lane cross-section was done in conjunction with the initial phase (four lanes) of Antonio Parkway. Through this portion of the study area, only minor grading would be required. Grading would be required for construction of the bridge abutments and the area south of the bridge. Approximately 100,000 cubic yards of cut and fill would be required for the project. Grading for the project would be balanced.

### **1.1.3 Approach to Water Quality Assessment**

To determine the potential water quality impacts of the San Antonio Parkway Project, the following factors will be analyzed and assessed:

- Pollutant sources and anticipated changes in concentration of point-source pollutants due to changes in land use;
- Pre-and post-project impervious areas and changes after project completion and in relation to the amount of runoff (and whether it increases or decreases);
- BMP technologies, types and numbers of BMPs to be used, and their efficiency;

- Amounts and types of discharges into impaired waters (as listed in Section 303(d) of the Federal Clean Water Act [CWA]); and
- Existing water quality regulations and methods of compliance.
- Applicable federal and state laws and regulations addressed in this report include:
- Federal Laws
  - Clean Water Act Sections 303(d) Total Maximum Daily Loads
  - Clean Water Act Section 401 Water Quality Certifications
  - Clean Water Act Section 402(p) Stormwater Management
  - USFWS Federal Endangered Species Act (FESA)
  - US ACOE CWA Section 404 Permit
- State Laws
  - Porter-Cologne Water Quality Act
  - California Toxics Rule
  - CDFG Section 1602 Streambed Alteration Agreement
  - SDRWQCB Water Quality Certification and Waste Discharge Permit
- Local Laws
  - County of Orange Approval of Water Quality Management Plan

## **2. AFFECTED ENVIRONMENT**

### **2.1 Population and Land Use**

Orange County has experienced significant growth in population over the past 40 years. Population in the county has increased from 216,200 in 1950 to an estimated 3,139,017 in 2009 based on the California Department of Finance data. Concurrent with these substantial increases in population, the economic character of Orange County has dramatically changed over the past 50 years. The predominately rural/agricultural and residential economy of the 1950s has changed to a well-diversified commercial/industrial economy.

The Project is located within the unincorporated portion of southeastern Orange County. The alignment traverses the Ranch Plan Planned Community. Though the area immediately adjacent to the roadway is mostly undeveloped, there are a number of land uses near the roadway. The unincorporated planned community of Ladera Ranch is located to the north. This community contains approximately 8,100 dwelling units and approximately 125 acres of Urban Activity Center Uses, a land use category defined as providing for high intensity mixed use development. The area east of the Project is currently undeveloped. The land adjacent to the northeastern portion of the Project is designated permanent open space. The area around Antonio Parkway is currently open space, but is approved for development as part of the Ranch Plan Planned Community. The Project traverses the portion of the Ranch Plan known as Planning Area 1 which has been approved for 1,170 residential units and 400,000 square feet of urban activity center uses.

### **2.2 Biological Communities**

The following vegetation communities occur in the Project site: coastal sage scrub, annual grassland, riparian, and oak forest. Coastal sage scrub supports a rich diversity of wildlife species, with some species restricted almost exclusively to this vegetation community. Grasslands provide foraging opportunities for many native wildlife species, especially raptors. Riparian habitats are biologically productive and diverse, and they are exclusive habitat of several Threatened or Endangered wildlife species and many other special-status plant and wildlife species. Oak forests are an important resource in California that provides aesthetic, cultural, economic, and environmental value in addition to wildlife habitat.



### **2.3 Aquatic Habitat**

Antonio Parkway crosses San Juan Creek immediately north of Ortega Highway. In the vicinity of the proposed bridge improvements, San Juan Creek is approximately 480 feet wide and includes low-flow channels lined by wetland and riparian vegetation alternating with adjacent terraces that are largely unvegetated or sparsely vegetated with upland forbs and subshrubs. Wetland areas are dominated by southern cattail (*Typha domingensis*, OBL), white watercress (*Rorippa nasturtium-aquaticum*, OBL), arroyo willow (*Salix lasiolepis*, FACW), black willow (*Salix gooddingii*, OBL), and mulefat (*Baccharis salicifolia*, FACW). The lower non-wetland terraces exhibit an Ordinary High Water mark (OHWM) characterized by the presence of litter and debris (debris wrack), shelving and terracing, destruction of terrestrial vegetation. Where the terraces exhibit vegetation, it is sparse and includes shrubs adapted to periodic high-energy flows such as scalebroom (*Lefidospartum squamatum*) and mulefat.

The San Juan Creek watershed is largely undeveloped, and the creek exhibits high levels of hydrologic, biogeochemical, and habitat functions as evidenced by the presence of a number of listed or otherwise special status animals such as the arroyo toad (*Anaxyrus californicus*), Least Bell's vireo (*Vireo belli pusillus*), yellow warbler (*Dendroica petechia*), and yellow-breasted chat (*Icteria virens*).

### **2.4 Surface Water Resources – Regional Hydrology**

The San Juan Creek watershed, located in the southern portion of Orange County, encompasses a drainage area of approximately 176 square miles and extends from the Cleveland National Forest in the Santa Ana Mountains to the Pacific Ocean at Doheny State Beach near Dana Point Harbor. The upstream tributaries of the watershed flow out of steep canyons and widen into several alluvial floodplains. The major streams in the watershed include San Juan Creek, Bell Canyon Creek, Chiquita Creek, Gobernadora Creek, Verdugo Canyon Creek, Oso Creek, Trabuco Creek, and Lucas Canyon Creek.

The San Juan Creek watershed is bounded on the north by the Santiago Creek, Aliso Creek, and Salt Creek watersheds and on the south by the San Mateo Creek watershed. The Lake Elsinore watershed, which is a tributary of the Santa Ana River watershed, is adjacent to the eastern edge of the San Juan Creek watershed.

## **2.5 Surface Water Resources – Local Hydrology**

Antonio Parkway crosses San Juan Creek immediately north of Ortega Highway. In the vicinity of the proposed bridge improvements, San Juan Creek is approximately 480 feet wide and includes low-flow channels lined by wetland and riparian vegetation. Estimates of the 2 and 10 year flow rate at San Juan Creek upstream of Horno Creek (approximately the location of the USGS streamflow gauge at La Novia Street) are 2,940 and 18,280 cfs respectively (PCR Services et.al., 2002)

A flooding analysis estimated that the 100 year Expected Value flow was 30,614 cubic feet per second (CFS) and the High Confidence flow is 41, 382 cfs (PACE, 2009). Mapping of the current 100-year floodplain, as designated by FEMA is depicted in Figure 2-1. The Antonio Parkway bridge deck is situated approximately 45 feet above the existing streambed, well above the highest calculated water surface elevation.

## **2.6 Geology and Groundwater Resources**

The predominant geological materials in the proposed Project site area include: engineering fill, topsoil, alluvial and colluvial deposits, and terrace deposits. Portions of the Antonio Parkway are underlain by bedrock of the Monterey Formation and Topanga Formation. The Topanga Formation has been observed locally to be highly interfingered with bedrock from the San Onofre Breccia which consists of damp and dense to very dense sandy gravel to clayey gravel with large angular boulders up to 6 feet in diameter.

Groundwater is present at the Project site in the form of unconfined groundwater with saturated alluvial deposits. This condition occurs within and immediately adjacent to the San Juan Creek floodplain, where groundwater is typically within five feet of the San Juan Creek valley line elevation. Minor groundwater is also present in the form of seepage that emanates from bedding planes, geologic contacts, fractures in bedrock units, and along geologic contacts.

## **2.7 Topography**

Figure 2-2 shows elevations of key points along the Project. As indicated in the figure elevations along the road centerline range from approximately 198.5 feet at the southern limit of the Project to 519.5 feet at the northern limit.

## **2.8 Climate**

The Mediterranean climate in Southern California is characterized by brief, intense storms between November and March. It is not unusual for a majority of the annual precipitation to fall during a few storms in close time proximity to one another. The higher elevation portions of the watershed typically receive significantly greater precipitation due to the effect of the Santa Ana Mountains. In addition, rainfall patterns are subject to extreme variations from year to year and longer term wet and dry cycles. These wet and dry cycles are shown in Figure 2-3 based on an analysis of five local rainfall records from gauges located in the vicinity of the Project. The analysis indicates that the mean annual precipitation ranges from about 12.4 to 18.7 inches/year depending on the rain gage and its elevation.

The combination of steep watersheds, brief intense storms and extreme temporal variability in rainfall results in “flashy” systems where stream discharge can vary by several orders of magnitude over very short periods of time.

The watersheds have been subject to numerous large-scale fires during the past 100 years. Most of these fire events were of human origin. The majority of ignitions have been associated with roadways, arson and person-related activities. Large fire events in the watersheds occurred in 1989, 1961, 1959, 1958, 1952, 1937, 1917 and 1915. The primary effects of these fires are a sharp increase in sediment yield and downstream channel aggradation for a period of time following the fire.

## **2.9 Soils/Erosion Potential**

The San Juan Creek watershed is located on the western slopes of the Santa Ana Mountains, which are part of the Peninsular Ranges that extend from the tip of Baja California northward to the Palos Verdes peninsula and Santa Catalina Island.

There are three major geomorphic terrains found within the San Juan Creek watershed: sandy and silty-sandy, clayey, and crystalline. These terrains are manifested primarily as roughly north-south oriented bands of different soil types. The soils and bedrock that comprise the western portions of the San Juan Creek watershed (i.e., Oso Creek, Arroyo Trabuco, and the lower third of San Juan Creek (the project location) contain a high percentage of clays. The soils typical of the clayey terrain include the Alo and Bosanko clays on upland slopes and the Sorrento and Mocho loams in floodplain areas. Clayey soils have soil erodibility factors K in the range of 0.25 – 0.4 depending on silt and loam content. In contrast sandy or silty soils may have values of soil erodibility as high

as 0.48 (Maidment, 1992). San Juan Creek is a braided sandy channel and as such is more vulnerable to channel incision or channel widening.

### **3. REGULATORY SETTING**

The Project, given potential effects on waters of the United States (WoUS) is subject to the following laws and regulations:

- Federal Clean Water Act (CWA)
- California Porter-Cologne Water Quality Control Act (Porter-Cologne Act)
- California Toxics Rule
- California Department of Fish and Game (CDFG) Section 1602
- General Construction Activity NPDES Permit
- Local Requirements

#### **3.1 Federal Requirements of the Clean Water Act**

##### **3.1.1 Section 303**

Section 303 of the CWA requires that the state adopt water quality objectives for surface waters. The Water Quality Control Plan for the San Diego Basin (Basin Plan) contains water quality objectives that are considered necessary to protect the specific beneficial uses it identifies. Section 303(d) specifically requires the state to develop a list of impaired water bodies and subsequent numeric Total Maximum Daily Loads (TMDLs) for constituents that impair a particular water body.

##### **3.1.2 Section 401**

Section 401 of the CWA specifies that any applicant for a federal license or permit to conduct any activity (including but not limited to the construction or operation of facilities that may result in any discharge into navigable water) shall provide the federal licensing or permitting agency with a certification. The certification must be issued by the state agency with jurisdiction over the waters from which the discharge originates or will originate. In this case, the state agency is the San Diego Regional Water Quality Control Board. The certification must convey that the project will comply with water quality standards, including beneficial uses, water quality objectives, and the state anti-degradation policy.

### **3.1.3 Section 402**

Direct discharges of pollutants into WoUS are not allowed, except in accordance with the National Pollutant Discharge Elimination System (NPDES) program established in Section 402 of the CWA. The main goal of the NPDES program is to protect human health and the environment. Pursuant to the NPDES program, permits that apply to stormwater discharges from municipal storm drain systems, specific industrial activities, and construction activities that disturb one acre or more have been issued. NPDES permits establish enforceable effluent limitations on discharges, require monitoring of discharges, designate reporting requirements, and require the permittee to implement BMPs. Municipal permits are governed by the maximum extent practicable (MEP) or the best available technology (BAT)/best control technology (BCT) application of BMPs.

### **3.1.4 Section 404**

The U.S. Army Corps of Engineers (ACOE) regulates discharges or fills into WoUS under Section 404 of the CWA via a nationwide permit (NWP) or an individual permit program. Several categories of NWPs can be used for projects that fall under specific categories. A pre-construction notification (PCN) to the ACOE district engineer is required for most activities that result in the loss of greater than 0.01 acre of WoUS. The ACOE review the PCN on a case-by-case basis to determine whether the adverse effects of the proposed work on the aquatic environment are minimal. The ACOE will also determine whether a particular drainage is considered discharging to WoUS and subject to regulation under Section 404.

## **3.2 State Water Quality Regulations**

### **3.2.1 Porter Cologne Water Quality Control Act (Division 7 of the California Water Code)**

The Porter-Cologne Act established a regulatory program to protect water quality and beneficial uses of state waters. It empowers each RWQCB to formulate and adopt, for all areas within its jurisdiction, a Basin Plan that designates beneficial uses and establishes water quality objectives that in its judgment will ensure reasonable protection of beneficial uses. Each RWQCB establishes water quality objectives that will ensure the reasonable protection of beneficial uses and the prevention of nuisance.

The California Water Code provides flexibility for some change in water quality, provided beneficial uses are not adversely affected.

### **3.2.2 California Toxics Rule**

The California Toxics Rule or CTR was put into effect by the U.S. Environmental Protection Agency (EPA) on May 18, 2000, established federal numeric water quality criteria for certain priority toxic pollutants for inland surface waters, enclosed bays, and estuaries for all purposes and programs under the CWA. The CTR applies the federal criteria requirement to waters in the State of California.

### **3.2.3 California Fish and Game Code Section 1602**

The CDFG, through provisions of the California Fish and Game Code Section 1602, is empowered to issue agreements for any alteration of a river, stream, or lake where fish or wildlife resources may be adversely affected. Streams and rivers are defined by the presence of a channel bed and banks and at least an intermittent flow of water. CDFG typically extends the limits of their jurisdiction laterally beyond the channel banks for streams that support riparian vegetation. In these situations, the outer edge of the riparian vegetation is generally used as the lateral extent of the stream and CDFG jurisdiction.

The California Fish and Game Code Section 1602 requires any person, state or local governmental agency, or public utility to notify the CDFG before beginning any activity that will result in one or more of the following:

1. Substantially obstruct or divert the natural flow of a river, stream, or lake;
2. Substantially change or use any material from the bed, channel, or bank of a river, stream, or lake; or
3. Deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into a river, stream, or lake.

California Fish and Game Code Section 1602 applies to all perennial, intermittent, and ephemeral rivers, streams, and lakes in the state.

### **3.2.4 Section 401 Water Quality Certification**

The San Diego RWQCB issued Waste Discharge Requirements and Clean Water Act Section 401 Water Quality Certification (Order No. R9-2006-0104) to Rancho Mission Viejo Community Development, LLC, for the Rancho Mission Viejo Ranch Plan Planning Area 1 project, including the portion of Antonio Parkway and La Pata Avenue within the Planning Area 1 boundary, on October 16, 2006. A Ranch Plan Planning Area 1 Master Area Water Quality Management Plan (WQMP) identified the water quality management approach that formed the basis for the issuance of the 401 Water Quality Certification. The WQMP included the following statement regarding runoff treatment for roadway projects associated with Planning Area 1:

*Roadway improvements associated with Planning Area 1 include widening of Ortega Highway, Antonio Parkway, and La Pata Avenue, and construction of Cow Camp Road within Planning Area 1. Each of these roadway improvement projects will add more than 5,000 square feet of new impervious surface area in the post-developed condition and therefore will require runoff treatment in accordance with the Caltrans MS4 Permit (Ortega Highway only) and the County DAMP/LIP. The treatment control BMPs provided for the improvements to Ortega Highway will be sized to include the drainage from the existing impervious area within the impacted area as well as from the new impervious area as required by the County DAMP/LIP, as the new impervious surface will result in an increase of more than 50 percent of the existing impervious surface area. The final treatment BMPs selected for these areas shall meet or exceed the treatment performance assumed in this WQMP for the pollutants of concern.*

Stormwater quality-related provisions of the Section 401 Certification that apply to the Antonio Parkway and La Pata Avenue project are summarized in Table 2-6.

### **3.2.5 General Construction Activity NPDES Permit**

Pursuant to the CWA Section 402(p), requiring regulations for permitting certain stormwater discharges, the State Water Resources Control Board (SWRCB) issued a statewide general NPDES Permit for stormwater discharges from construction sites [(NPDES No. CAR000002) Water Quality Order 2009-0009-DWQ, State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction Activity (adopted by the SWRCB on September 2, 2009)].



Under this Construction General Permit, discharges of stormwater from construction sites with a disturbed area of one or more acres (effective July 1, 2010) are required to either obtain individual NPDES permits for stormwater discharges or to be covered by the Construction General Permit. Coverage under the Construction General Permit is accomplished by completing a construction site risk assessment to determine appropriate coverage level; preparing a Stormwater Pollution Prevention Plan (SWPPP), including site maps, a Construction Site Monitoring Program (CSMP), and sediment basin design calculations; for projects located outside of a Phase I or Phase II permit area, completing a post-construction water balance calculation for hydromodification controls; and completing a Notice of Intent. All of these documents must be electronically submitted to the SWRCB for General Permit coverage. The primary objective of the SWPPP is to identify and apply proper construction, implementation, and maintenance of BMPs to reduce or eliminate pollutants in stormwater discharges and authorized non-stormwater discharges from the construction site during construction. The SWPPP also outlines the monitoring and sampling program required for the construction site to verify compliance with discharge Numeric Action Levels (NALs) set by the Construction General Permit.

### **3.3 Local Requirements**

NPDES Permit and Waste Discharge Requirements Order No. R9-2002-0001 regulates discharges of urban runoff from municipal separate storm sewers (MS4s) in that portion of Orange County within the San Diego Region Water Quality Control Board. The MS4 permit stipulates requirements for new development and significant redevelopment, including specific selection and sizing criteria for treatment control BMPs. To implement the requirements of the NPDES permit, the Co-permittees developed a 2003 Drainage Area Management Plan (DAMP) that includes a New Development and Significant Redevelopment Program (OCDMD, 2003). This Program provides a framework and a process for following the NPDES permit requirements and incorporates watershed protection/stormwater quality management principles into the Co-permittees' General Plan process, environmental review process, and development permit approval process. The County of Orange and the Orange County Flood Control District adopted a DAMP Local Implementation Plan (2003 DAMP Appendix A) in July, 2003. Exhibit A-7.VI of the County's Local Implementation Plan, the County of Orange Local WQMP, contains the requirements placed upon all new development and significant redevelopment projects in the unincorporated County south of El Toro Road. These requirements apply to the Antonia Parkway Widening Project.

### **3.4 Beneficial Uses**

San Juan Creek is the receiving water for this Project and is therefore potentially the affected water resource for the Project. Beneficial uses of water are defined in the San Diego RWQCB's Basin Plan as those necessary for the survival or well being of humans, plants, and wildlife.

#### **3.4.1 Beneficial Uses for Surface Waters**

Beneficial uses for San Juan Creek are the following:

- AGR: Agricultural Supply
- IND: Industrial Service Supply
- COLD: Cold water habitat for fish amenable for reproduction in cold water
- WARM: Warm water habitat for fish amenable for reproduction in warm water
- WILD: Habitat for wild plants and animals
- REC-1: Body-contact recreations (swimming/wading)
- REC-2: Non-body contact recreation (boating/fishing)

#### **3.4.2 Beneficial Uses for Groundwater**

Beneficial uses for the Lower San Juan Groundwater Basin are:

- MUN: Municipal and Domestic Supply
- AG: Agricultural Supply
- IND: Industrial Service Supply

### **3.5 Water Quality Objectives**

As required by the Porter-Cologne Act, the San Diego RWQCB has developed water quality objectives for waters within its jurisdiction to protect the beneficial uses of those waters and has published them in the Basin Plan. The Basin Plan also established implementation programs to achieve these water quality objectives and requires monitoring to evaluate the effectiveness of these programs. Water quality objectives must comply with the state anti-degradation policy (State Board Resolution No. 68-16),

which is designed to maintain high-quality waters while allowing some flexibility if beneficial uses

### **3.5.1 Surface Water Quality Objectives**

Surface water quality objectives applicable to the Lower San Juan Creek were compiled based on a review of Chapter 3 Water Quality Objectives of the San Diego RWQCB Basin Plan, and consideration of the California Toxic Rule (Table 3-1).

### **3.5.2 Existing Water Quality**

Water quality data from San Juan Creek collected by the Orange County Resources and Development Management Department (OCRDMD) from 2000 through 2006 are available, including data from a station near the La Novia Bridge (Figure 2-4). The La Novia Street Bridge monitoring station is located on the main stem of San Juan Creek in San Juan Capistrano. Dry weather data is also available for San Juan Ortega Highway station (station SJC-84) for 2003-2006.

Available wet-weather monitoring data at La Novia station (SJNL01) from Orange County are summarized in and includes conventional parameters and organics, including pesticides, while includes metals and hardness data. Water quality objectives from the San Diego Basin Plan and California Toxic Rule (CTR) are also provided in the tables. In Table 3-1, Metals toxicity is hardness dependent and where hardness values vary and are less than 400 mg/l the WQO varied for each sample. Constituents with 3 or greater exceedances include phosphorus, diazinon, and dissolved oxygen. For metals (Table 3-2) only total copper had 3 exceedances of the acute CTR objective.

Dry weather data collected by Orange County at San Juan Ortega Highway monitoring station (SJC-74) for conventional and organics are summarized in , and for total metals in Table 3-4. In general concentrations of constituents during dry weather are much lower than during wet events. For example the dry weather mean TSS from Table 3-3 is 16 mg/L compared to a mean concentration of 153 mg/L from Table 3-1. Similarly the total metals data during dry weather as indicated in Table 3-4 are much lower that the corresponding wet weather data shown in Table 3-2.

**Table 3-1: Summary of Wet Weather Data La Novia, SJNL01, 2000-2006, Conventional Parameters and Organics**

Constituent	Units	Total No. Samples	No. of Non-Detects	Mean	Water Quality Objective	No. of Exceedances (Detects Only)
DO	mg/L	36	0	10.8	5	3
Average pH (field and lab)	mg/L	113	N/A	8	6.5-8.5	
Nitrate + Nitrite as N	mg/L	79	15	0.69	10	0
Ammonia as N	mg/L	80	49	0.47	note	note
TKN	mg/L	80	3	1.3	None	
Total Phosphate as P	mg/L	79	4	0.33	0.1	51
Ortho phosphate as P	mg/L	58	3	0.16	0.1	26
TSS	mg/L	80	20	153	narrative	N/A
VSS	mg/L	80	42	27.45	None	N/A
Diazinon	ng/L	48	30	86.6	80	11
Chlorpyrifos	ng/L	48	48	< 48 <sup>(1)</sup>	20	All ND
Dimethoate	ng/L	38	37	NM	1000	0
Malathion	ng/L	38	31	138	430	2

**NOTES:**

Ammonia-N standard is pH and temperature dependent. Most samples did not have discrete pH and temperature measurements; therefore the ammonia standard could not be calculated. When the ammonia standard could be calculated, there were no exceedances of the standard.

NM = Not Meaningful = all but one result was reported as ND (and the detected sample's duplicate was also ND), and detection limits varied; therefore a mean concentration is not meaningful.

(1) All results were ND; the mean (< 48 ng/L) is above the WQO because detection limits for 2 samples were 1,000 ng/L.

**Table 3-2: Summary of Wet Weather Data La Novia, SJNL01, 2000-2006, Metals and Hardness**

Constituent	Units	Total No. Samples <sup>1</sup>	No. NDs <sup>1</sup>	Mean	Water Quality Objective	No. Exceedances (Detects Only)
Total Cadmium	µg/L	78	138	1.1	Hardness dependent	0
Total Chromium	µg/L	78	132	8.1	Hardness dependent	0
Total Copper	µg/L	78	2	12.4	Hardness dependent	3
Total Lead	µg/L	78	115	2.9	Hardness dependent	0
Total Nickel	µg/L	78	64	8	Hardness dependent	0
Total Silver	µg/L	78	155	NM	Hardness Dependent	0
Total Zinc	µg/L	78	56	32.7	Hardness dependent	1
Total Arsenic	µg/L	5	1	4.9	340	0
Total Selenium	µg/L	5	3	2.8	5	0
Hardness as CaCO <sub>3</sub>	mg/L	71	0	459.4	none	N/A

**NOTES:**<sup>1</sup> for metals each sample and DUP counts as 1 sample

Hardness-dependent criteria were calculated for each discrete sampling event.

NM = Not Meaningful = all but one result was reported as ND (and the detected sample's duplicate was also ND), and detection limits varied; therefore a mean concentration is not meaningful.

**Table 3-3: Summary of Dry Weather Data San Juan Ortega Highway, SJC-74, 2003-2006, Conventional Parameters and Organics**

<b>Constituent</b>	<b>Units</b>	<b>Total No. Samples</b>	<b>No. NDs</b>	<b>Mean</b>	<b>Water Quality Objective</b>	<b>No. Exceedances (Detects Only)</b>
<b>DO</b>	mg/L	6	0	8.62	5	1
<b>Turbidity</b>	NTU	7	0	13.2	Narrative	N/A
<b>Average pH field and lab</b>	pH Units	7	N/A	7.5	6.5-8.5	0
<b>Nitrate + Nitrite as N</b>	mg/L	7	0	0.31	10	0
<b>Ammonia as N</b>	mg/L	7	7	< 0.07	pH and Temp dependent	0
<b>TKN</b>	mg/L	7	2	0.4	None	N/A
<b>Tot Phosphate as P</b>	mg/L	7	0	0.16	0.1	1
<b>Ortho Phosphate as P</b>	mg/L				0.1	
<b>TSS</b>	mg/L	7	0	16	Narrative	N/A
<b>VSS</b>	mg/L	7	0	7	Narrative	N/A
<b>Diazinon</b>	ng/L	7	7	< 147	50	0
<b>Chlorpyrifos</b>	ng/L	7	7	< 147	14	0
<b>Dimethoate</b>	ng/L	7	7	< 148	1000	0
<b>Malathion</b>	ng/L	7	7	< 148	430	0

**Table 3-4: Summary of Dry Weather Data San Juan Ortega Highway, SJC-74, 2003-2006, Metals and Hardness**

Constituent	Units	Total No. Samples <sup>1</sup>	No. NDs <sup>1</sup>	Mean	Water Quality Objective	No. Exceedances (Detects Only)
Total Cadmium	µg/L	7	14	< 0.8	7.3	0
Total Chromium	µg/L	7	14	< 4.8	640	0
Total Copper	µg/L	7	4	3	30	0
Total Lead	µg/L	7	14	< 1.4	19	0
Total Nickel	µg/L	7	6	4.6	170	0
Total Silver	µg/L	7	14	< 1.4	44	0
Total Zinc	µg/L	7	5	12.2	390	0
Total Arsenic	µg/L	2	2	2.1	150	0
Total Selenium	µg/L	2	2	1.6	5	0
Hardness as CaCO <sub>3</sub>	mg/L	4	0	485	none	N/A

**NOTES:**

<sup>1</sup> for metals each sample and DUP counts as 1 sample

### **3.6 List of Impaired Waters**

Where the applicable water quality standard for protection of designated beneficial uses has not been attained, Section 303(d) of the Clean Water Act requires identifying and listing that water body as “impaired”. Once a water body has been deemed impaired, a Total Maximum Daily Load (“TMDL”) must be developed for each water quality constituent that compromises a beneficial use. A TMDL is an estimate of the total load of pollutants, from point, non-point, and natural sources, that a water body may receive without exceeding applicable water quality standards (with a “factor of safety” included). For point sources, including stormwater, the load allocation is referred to as a “Waste Load Allocation” whereas for nonpoint sources, the allocation is referred to simply as a “Load Allocation”. Once established, the TMDL allocates the loads among current and future dischargers into the water body. Table 2 lists the water bodies within the San Juan watershed that have been included on the 2006 303(d) list.

**Table 3-5: 2006 CWA Section 303(d) Listings for the San Juan Creek Watershed**

<b>Water Body</b>	<b>Pollutant</b>	<b>Extent</b>
San Juan Creek (mouth)	Indicator Bacteria	Mouth (6.3 acres)
San Juan Creek	DDE	1 mile
	Indicator Bacteria	1 mile

As indicated in Table 3-5, the lower portion of San Juan Creek and the Pacific Ocean at the mouth of the creek are listed for bacteria indicators. Fecal bacteria originate from the intestinal flora of warm-blooded animals, and their presence in surface water is used as an indicator of human pathogens. Pathogens can cause illness in recreational water users and people who harvest and eat filter-feeding shellfish. Bacteria have been historically used as indicators of human pathogens because they are easier and less costly to measure than the pathogens themselves. TMDLs for indicator bacteria were developed to address 17 of the 38 bacteria-impaired waterbodies in the San Diego Region, as identified on the 2002 303(d) List of Water Quality Limited Segments. This phase of the TMDL is referred to as 'Project I - Beaches and Creeks in the San Diego Region.' A Draft TMDL Technical Report was issued on December 9, 2005 and a revised Draft Technical Report was issued on March 9, 2007. Included with this report was a proposed amendment to the Water Quality Control Plan for the San Diego Basin (San Diego Basin Plan) (SDRWQCB, 1994) that establishes the TMDLs and associated load and wasteload allocations for total coliform, fecal coliform, and enterococci bacteria.

A revised TMDL for indicator bacteria has been developed by the San Diego RWQCB. The Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creek in the San Diego Region, has been developed to address bacteria-impaired beaches and creeks in 13 watersheds in the San Diego Region, including the San Juan Creek. A public hearing for Revised Bacteria TMDLs Project I has been tentatively scheduled for February 10, 2010

The lower portion of San Juan Creek was also listed for a legacy pesticide (DDE is a break down product of DDT) in the 2006 303(d) List. The updated 2008 303(d) list, The Clean Water Act Sections 303(d) and 305(b) Integrated Report for the San Diego Region, was approved by the San Diego Regional board on December 16, 2009. The Integrated Report, including the updated 303(d) list, was submitted to the State Water Resources Control Board (State Board) for approval along with the other Region's



reports, and is awaiting approval. The 2008 303(d) list suggests adding listings for Diazinon, Phosphorus, Selenium, Total Nitrogen as N, and Toxicity for San Juan Creek. See Table 3-6 below for the complete 2008 303(d) listed constituents.

**Table 3-6: Proposed 2008 CWA Section 303(d) Listings for the San Juan Creek Watershed**

<b>Water Body</b>	<b>Pollutant</b>	<b>Extent</b>
San Juan Creek (mouth)	Indicator Bacteria	6.3 Acres
San Juan Creek	DDE	1 mile
	Diazinon	1 mile
	Indicator Bacteria	1 mile
	Phosphorus	1 mile
	Selenium	1 mile
	Total Nitrogen as N	1 mile
	Toxicity	1 mile

## **4. ENVIRONMENTAL CONSEQUENCES**

This chapter discusses the local agency procedures and practices followed to select evaluate impacts, pollutants of concern, recommended preliminary design features (PDFs), potential short and long-term impacts to water quality, and cumulative impacts.

### **4.1 Local Agency Procedures and Practices for Accessing Impacts**

The National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements (Order No. R9-2002-0001) issued by the San Diego RWQCB regulate discharges of urban runoff from municipal separate storm sewer systems (MS4s) in the portion of Orange County within the San Diego RWQCB's jurisdiction. The MS4 permit stipulates requirements for new development and significant redevelopment, including specific selection and sizing criteria for treatment control BMPs.

To implement the requirements of the NPDES Permit, the co-permittees developed a 2003 Drainage Area Management Plan (DAMP) that includes a New Development and Significant Redevelopment Program. This program provides a framework and a process for following the NPDES permit requirements and incorporates watershed protection/storm water quality management principles into the Co-permittees' General Plan process, environmental review process, and development permit approval process. The County of Orange and the Orange County Flood Control District adopted a DAMP Local Implementation Plan in July 2003. The County's Local Implementation Plan contains the requirements for all new developments and significant redevelopment projects that would apply to the Project.

### **4.2 Pollutants of Concern**

Priority projects within Orange County are required to reduce pollutants of concern in stormwater discharges to the maximum extent practicable through the incorporation and implementation of treatment control BMPs. To meet this requirement, projects must incorporate a stormwater treatment control BMP or a combination of BMPs that will address the pollutants of concern. Primary pollutants of concern are anticipated or potential pollutants in project runoff, based on proposed land uses, which have also been identified as causing impairment of receiving waters on the most recent 303(d) list. Other pollutants of concern are anticipated or potential pollutants that have not been identified as causing impairment of receiving waters.

Runoff quality from highways is highly variable depending on various factors including climatic conditions, annual average daily traffic (AADT), roadway and shoulder material and conditions, surrounding land use, and other factors. Caltrans conducted a Discharge Characterization Study that compiled and analyzed water quality data from various Caltrans facilities. The data for highway runoff covered three wet seasons from 2000/2001 thru 2002/2003. The data from that report is reproduced in Table 4-1 and shows the number of sites, data points, percent of samples above the detection limits and statistics for a range of constituents including hydrocarbons, metals, pesticides, and semi-volatile organics. A measure of the variability in the data is given by the standard deviation which often is comparable to or larger than the mean.

The samples that were analyzed are based on flow weighted composite samples, sometimes referred to as “Event Mean Concentrations”. The statistics are based on the pooled event data for all the sites, where the total number of events ranges from 8 to 635 depending on the constituent. Where the percent of detects were low, sample statistics are not given.

**Table 4-1: Caltrans Highway Runoff Water Quality Data (2000/01-2002/03)**

Pollutant Category	Pollutant	Units	N	Number of Sites	% Detected	Min	Max	Median	Mean	Std. Dev.
Conventionals	DOC	mg/L	635	46	100	1.2	483	13.1	18.7	26.2
	pH	pH	633	46	100	4.47	10.1	7	7.1	0.7
	TDS	mg/L	635	46	97	3.7	1800	60.3	87.3	103.7
	TOC	mg/L	635	46	100	1.6	530	15.3	21.8	29.2
	TSS	mg/L	634	46	99	1	2988	59.1	112.7	188.8
	Turbidity	NTU	—	—	—	—	—	—	—	—
Hydrocarbons	Oil & Grease	mg/L	49	10	29	5	61	1.44	4.95	11.41
	TPH (Diesel)	mg/L	32	4	97	0.22	13	2.52	3.72	3.31
	TPH (Gasoline)	mg/L	32	4	0	ND	ND	ND	IDD	IDD
	TPH (Heavy Oil)	mg/L	20	4	95	0.12	13	1.4	2.71	3.4
Metals	As, dissolved	µg/L	635	46	40	0.5	20	0.7	1	1.4
	As, total	µg/L	635	46	62	0.5	70	1.1	2.7	7.9
	Cd, dissolved	µg/L	635	46	42	0.2	8.4	0.13	0.24	0.54
	Cd, total	µg/L	635	46	76	0.2	30	0.44	0.73	1.61
	Cr, dissolved	µg/L	635	46	80	1	23	2.2	3.3	3.3
	Cr, total	µg/L	635	46	97	1	94	5.8	8.6	9

Pollutant Category	Pollutant	Units	N	Number of Sites	% Detected	Min	Max	Median	Mean	Std. Dev.
	Cu, dissolved	µg/L	635	46	100	1.1	130	10.2	14.9	14.4
	Cu, total	µg/L	635	46	100	1.2	270	21.1	33.5	31.6
	Hg, dissolved	ng/L	19	4	16	2.5	110	IDD	IDD	IDD
	Hg, total	ng/L	23	4	39	7.8	160	26	36.7	37.9
	Ni, dissolved	µg/L	635	46	79	1.1	40	3.4	4.9	5
	Ni, total	µg/L	635	46	95	1.1	130	7.7	11.2	13.2

Based on the above data and guidance in the County of Orange Local Implementation Plan, the Pollutants of Concern are:

- Heavy metals
- Nutrients
- Pesticides
- Organic compounds, including petroleum hydrocarbons and oil and grease
- Sediment
- Trash and debris
- Oxygen-demanding substances (pesticides and petroleum hydrocarbons)

Indicator bacteria, although on the proposed 2008 303(d) list, is not considered a pollutant of concern because roadways are not typical sources of indicator bacteria.

#### **4.3 Recommended Long Term Preliminary Design Features**

The project area, for the purposes of the BMP plan, consists of three segments:

- Segment A of Antonio Parkway,
- Segment B of Antonio Parkway, and
- La Pata Avenue.

Segment A of Antonio Parkway extends from Ladera Ranch south to the northern terminus of the San Juan Creek Bridge. Segment B of Antonio Parkway includes the San Juan Creek Bridge and Antonio Parkway from the southern end of the San Juan Creek Bridge to the intersection of Antonio Parkway and Ortega Highway. The La Pata

Avenue Segment extends south from Ortega Highway to the southern boundary of Rancho Mission Viejo Ranch Plan Planning Area 1.

The proposed preliminary design features were selected to address the pollutants of concern in stormwater discharges from the project with medium or high effectiveness, as required by the DAMP. The recommended preliminary design features for each roadway segment are discussed in the following sections.

#### ***Antonio Parkway Segment A***

The recommended preliminary design feature for managing runoff water quality from Segment A of Antonio Parkway is cartridge media filtration (CMF). The cartridge filters can be located either in curb inlets distributed along the roadway length, or in a single vault for the entire segment drainage located at the southern end of the roadway segment. The preferred cartridge filter media is a combination of perlite, zeolite, and granular activated carbon.

#### ***Antonio Parkway Segment B***

The recommended preliminary design feature for managing runoff water quality from Segment B of Antonio Parkway, with the exception of the existing San Juan Creek Bridge deck (see existing bridge deck discussion below), will be collection in a storm drain system and routing to a water quality detention basin in Parcel 5 for water quality treatment. The Segment B drainage area is 4.6 acres, with a water quality design volume of 0.31 acre-feet. In addition, a 5.4 acre portion of La Pata Avenue (see further discussion below), with a water quality volume of 0.14 acre-feet will also be treated in the basin. In total, runoff from ten acres of roadway, with a total water quality volume of 0.45 acre-feet, will be treated in the basin.

The existing San Juan Creek Bridge drains through deck inlets directly to San Juan Creek. Retrofitting the existing bridge deck with a storm drain system is not required with current water quality standards. Under the County's Drainage Area Management Plan, retrofitting the existing bridge is not required because the percentage increase in impervious surface is less than 50 percent of the amount of existing impervious area. Therefore, the County would not be required to treat runoff from the existing portion of the bridge.

### ***La Pata Avenue***

The recommended preliminary design feature for managing runoff water quality from the northern 5.4 acres of La Pata Avenue, the portion of the roadway adjacent to Ranch Plan Planning Area 1, Parcel 6, will be collected in a storm drain system and routed to the proposed detention basin in the community park (Parcel 5) for water quality treatment..

The remaining portion of La Pata Avenue, south of Parcel 6 to the southern boundary of Planning Area 1, will be treated by CMF. The cartridge filters would be located either in inlets distributed along the roadway length, or in a single vault for the entire segment drainage. The preferred cartridge media is a combination of perlite, zeolite, and granular activated carbon.

#### **4.4 Recommended Short Term Preliminary Design Features**

Erosion control BMPs are designed to prevent erosion, whereas sediment controls are designed to trap or filter sediment once it has been mobilized. A SWPPP will be developed as required by, and in compliance with, the Construction General Permit and the County of Orange Standard Conditions. The General Permit requires the SWPPP to include BMPs to be selected and implemented to effectively control erosion and sediment to the BAT/BCT. The following types of BMPs are preliminary recommendations to be considered during the construction phase of the Project:

##### **Erosion Control**

- Physical stabilization through hydraulic mulch, soil binders, straw mulch, bonded and stabilized fiber matrices, compost blankets, and erosion control blankets (i.e., rolled erosion control products).
- Limiting the area and duration (<14 days) of exposure of disturbed soils.
- Soil roughening of graded areas (through track walking, scarifying, sheepsfoot rolling, or imprinting) to slow runoff, enhance infiltration, and reduce erosion.
- Vegetative stabilization through temporary seeding and mulching to establish interim vegetation.
- Wind erosion (dust) control through the application of water or other dust palliatives as necessary to prevent and alleviate dust nuisance.

### Sediment Control

- Perimeter protection to prevent sediment discharges (silt fences, fiber rolls, gravel bag berms, sand bag barriers, and compost socks).
- Storm drain inlet protection.
- Sediment capture and drainage control through sediment traps and sediment basins.
- Velocity reduction through check dams, sediment basins, and outlet protection/velocity dissipation devices.
- Reduction in off-site sediment tracking through stabilized construction entrance/exit, construction road stabilization, and entrance /exit tire wash.
- Slope interruption at permit-prescribed intervals (fiber rolls, gravel bag berms, sand bag berms, compost socks, biofilter bags).

### Waste and Materials Management

- Management of the following types of materials, products, and wastes: solid, liquid, sanitary, concrete, hazardous and equipment-related wastes. Management measures include covered storage and secondary containment for material storage areas, secondary containment for portable toilets, covered dumpsters, dedicated and lined concrete washout/waste areas, proper application of chemicals, and proper disposal of all manners of wastes.
- Protection of soil, landscaping and construction material stockpiles through covers, the application of water or soil binders, and perimeter control measures.
- A spill response and prevention program will be incorporated as part of the SWPPP and spill response materials will be available and conspicuously located at all times on-site.

### Non-Stormwater Management

- BMPs or good housekeeping practices to reduce or limit pollutants at their source before they are exposed to stormwater, including such measures as: water conservation practices, vehicle and equipment cleaning and fueling practices, and street sweeping. All such measures will be recorded and maintained as part of the project SWPPP.

- If construction dewatering or discharges from other specific construction activities such as water line testing, and sprinkler system testing are required, comply with the requirements of the “General Waste Discharge Requirements for Discharges from Groundwater Extraction and Similar Discharges to Surface Waters within the San Diego Region except for San Diego Bay (WDR)” [Order No. R9-2008-0002, NPDES No. CAG919002] for regions other than San Diego Bay, and comply with the “General Waste Discharge Requirements for Temporary Groundwater Extraction and Similar Waste Discharges to San Diego Bay and Storm Drains or other conveyance systems tributary thereto” [Order No. 2000-09; NPDES No. CAG919001] for discharges to the San Diego Bay area.

#### Training and Education

- Inclusion of General Permit defined “Qualified SWPPP Developers” (QSD) and “Qualified SWPPP Practitioners” (QSP). QSDs and QSPs shall have required certifications and shall attend State Board sponsored training.
- Training of individuals responsible for SWPPP implementation and permit compliance, including contractors and subcontractors.
- Signage (bilingual, if appropriate) to address SWPPP-related issues (such as site cleanup policies, BMP protection, washout locations, etc).

#### Inspections, Maintenance, Monitoring, and Sampling

- Performing routine site inspections and inspections before, during (for storm events > 0.5 inches), and after storm events.
- Preparing and implementing Rain Event Action Plans (REAPs) prior to any storm event with 50% probability of producing 0.5 inches of rainfall, including performing required preparatory procedures and site inspections.
- Implementing maintenance and repairs of BMPs as indicated by routine, storm-event, and REAP inspections.
- Implementation of the Construction Site Monitoring Plan for non-visible pollutants, if a leak or spill is detected.
- Sampling of discharge points for turbidity and pH, at minimum, three times per qualifying storm event and recording and retention of results.

The County of Orange’s municipal separate storm sewer (MS4) NPDES permit governs operation and maintenance of County roadway project BMPs once they are completed.



The discharges from a facility shall not create a condition of nuisance or adversely affect the beneficial uses of waters of the state. As part of the County of Orange's Local Implementation Plan, BMPs will be implemented to minimize potential stormwater pollution from accidental spills, illicit connections, and illegal discharges and dumping. As appropriate, illegal discharges and dumping are reported to local enforcement agencies when discovered.

#### **4.5 Potential Impacts to Water Quality**

Runoff from the Project will ultimately enter San Juan Creek, the receiving water for the Project. Discharge locations into San Juan Creek will vary depending on segment. Treated runoff from Segment A of Antonio Parkway will enter San Juan Creek via an outfall located on the north bank of San Juan Creek and downstream of the Antonio Parkway bridge over San Juan Creek. Runoff from Segment B and a portion of Segment C will be treated in a detention basin located northwest of the intersection of Antonio Parkway and Ortega Highway. Runoff from the remaining portion of Segment C will also enter San Juan Creek via an outfall located on the south side of San Juan Creek and west of the Antonio Parkway bridge over San Juan Creek. The following describes short-term potential impacts to this receiving water during the construction phase of the project, followed by long term potential impacts following construction.

##### **4.5.1 Short-Term Impacts during Construction**

The potential impacts of construction activities, construction materials, and non-stormwater runoff on water quality during the construction phase are primarily due to sediment and certain non-sediment related pollutants. Sediment can cause increases in turbidity thereby reducing light transmittance needed to sustain aquatic vegetation. Sediment also can cause increased sedimentation that could adversely affect benthic habitat. Construction-activities that are primarily responsible for sediment releases are related to exposing previously stabilized soils to potential mobilization by rainfall/runoff and wind. Such activities include removal of vegetation from the site, grading of the site, and trenching for infrastructure improvements. Environmental factors that affect erosion include topographic, soil, and rainfall characteristics.

Non sediment-related pollutants that are also of concern during construction relate to construction materials and non-stormwater flows and include construction materials (e.g., paint, stucco, etc); chemicals, liquid products, and petroleum products used in building construction or the maintenance of heavy equipment; and concrete-related pollutants. Such constituents can be toxic to aquatic organism and create and oxygen

demand that results in reduced dissolved oxygen concentrations. Nutrients and fertilizers used in stabilizing the construction site could contribute to the growth of stream algae and also contribute to reduced DO levels when the algae decompose.

Construction impacts due to project development will be minimized through compliance with the Construction General Permit. This permit requires the discharger to prepare and implement a Storm Water Pollution Prevention Plan (SWPPP), which must include erosion and sediment control BMPs as well as BMPs that control the other potential construction-related pollutants. A Construction Site Monitoring Program that identifies monitoring and sampling requirements during construction is a required component of the SWPPP. If construction BMPs are properly designed, implemented, and maintained, as presented above, then no adverse water quality impacts would occur during construction of the proposed project.

#### **4.5.2 Long-Term Impacts during Operation**

Pollutants of concern during operation of a transportation facility include those noted in Section 4.2 of this report. Because the project consists of lane additions, it would result in a permanent increase of impervious surfaces and a permanent increase in runoff and pollutant loading.

As described above, the proposed controls for the various segments of the project will be either a water quality detention basin or cartridge media filters (or equivalent). Table 4-1 shows the estimated performance for each control based on data collected by Caltrans as part of its BMP Retrofit Pilot Program (Caltrans, 2003). The performance is expressed in terms of effluent concentrations provided in the Caltrans Pilot Program report. The 90% confidence intervals for the effluent concentration are also provided.

Operation of the project is subject to the requirements of the County of Orange NPDES Permit and requirements in the Orange County Drainage Area Master Plan and Local Implementation Plan. Key requirements met by this project include:

1. Identification of pollutants of concern based on existing water quality and regulatory requirements for receiving waters, including sensitive water bodies identified as impaired or for which TMDLs have been developed.
2. Consideration of pollution prevention, site design, and treatment alternatives to mitigate the effects of increases in runoff quantity and quality.

3. Selection of controls based on recommended effectiveness of alternative controls given pollutants of concern.
4. Sizing of treatment controls following sizing criteria provided.
5. Development of maintenance plan

Following these requirements, the project incorporates control measures and maintenance guidelines that will result in less than significant adverse impacts to water quality.

#### **4.6 Cumulative Impacts**

Cumulative impacts are impacts on the environment that result from the incremental impact of the proposed project together with impacts of other past, present, and reasonably foreseeable future projects. Cumulative impacts can result from individually minor but collectively significant impacts taking place over a period of time. The cumulative water resources evaluation focuses on San Juan Creek because it is the only water body that could potentially be affected by the proposed Project. The Project would implement recommended preliminary design features that would treat runoff from the roadway.

As with other resources evaluated, the Ranch Plan would have the greatest cumulative contribution to changes in water resources. When adopting the Ranch Plan, the County of Orange required extensive water quality and monitoring programs to ensure no deterioration in water quality. Therefore, no substantive cumulative water quality impacts are anticipated.

## **5. AVOIDANCE AND MINIMIZATION MEASURES**

The County of Orange Drainage Area Master Plan / Local Implementation Plan is the guidance for compliance with the NPDES Permit requirement for discharge. The short and long-term preliminary design features are recommended to avoid or minimize adverse impacts to water resources and would be incorporated into the final design of the proposed project. Compliance with the standard requirements of the DAMP/LIP for potential short- (during construction) and long-term (post construction/maintenance) impacts (listed below in Measures WQ-1, WQ-2, and WQ-3) is required.

- WQ-1** Preparation and implementation of construction site BMPs in compliance with the provisions of the Construction General Permit ((NPDES No. CAS000002) Water Quality Order 2009-0009-DWQ, State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction Activity) and any subsequent permit as they relate to construction activities for the project. This will include submission of a Notice of Intent (NOI) to the San Diego RWQCB at least 30 days before the start of construction, preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP), and submission of a Notice of Construction Completion (NCC) to the San Diego RWQCB upon completion of construction and stabilization of the project site.
- WQ-2** Consideration and incorporation of source control and treatment control best management practices (BMPs) for the project in accordance with the procedures outlined in the Drainage Area Master Plan and Local Implementation Plan (2003 or subsequent issuance) will be followed.
- WQ-3** During dewatering activities, if necessary, the provision of “General Waste Discharge Requirements for Discharges from Groundwater Extraction and Similar Discharges to Surface Waters within the San Diego Region except for San Diego Bay (WDR)” [Order No. R9-2008-0002, NPDES No. CAG919002] for regions other than San Diego Bay, and comply with the “General Waste Discharge Requirements for Temporary Groundwater Extraction and Similar Waste Discharges to San Diego Bay and Storm Drains or other conveyance systems tributary thereto” [Order No. 2000-09; NPDES No. CAG919001] for discharges

to the San Diego Bay area, as they relate to construction activities for the project, will be followed. This will include submission of an NOI to the San Diego RWQCB at least three months before the start of dewatering and compliance with all applicable provision in the de minimus permit, including water sampling, analysis, and reporting of dewatering-related discharges.

## **6. REFERENCES**

- Balance Hydrologics, 2001. Appendix B, Baseline Water Quality Conditions, San Juan/San Mateo Creeks Special Area Management Plan (SAMP), Southern Orange County, California, September.
- Caltrans, 2002. BMP Retrofit Pilot Program Proposed Final Report, RPT. CTSW-RT-01-050, California Department of Transportation, Sacramento, CA.
- Caltrans, 2003. Discharge Characterization Study Report, RPT. CTSW-RT-03-065.51.42, California Department of Transportation, Sacramento, CA.
- Maidment, D.R. Editor, 1992. Handbook of Hydrology, McGraw Hill Co.
- Orange County Public Facilities Resources Department (OCPFRD), 2003. Drainage Area Management Plan (DAMP). September 2003. A Cooperative Project of the County of Orange, The Cities of Orange County, and Orange County Flood Control District.
- PACE, 2009. Location Hydraulic Study –Antonio Parkway Bridge Stream Bank Revetment-San Juan Creek.
- PCR Services Corporation and Dudek and Associates, 2002. Geomorphic and Hydrologic Needs of Aquatic and Riparian Endangered Species, Agency Review Draft. Prepared for Rancho Mission Viejo, August 2002.
- PCR Services Corporation; PWA, Ltd.; and Balance Hydrologics, Inc.; 2002. Baseline Geomorphic and Hydrologic Conditions, Final Version. Prepared for Rancho Mission Viejo, February 2002.
- Water Environment Federation, 1998. Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87.
- SDRWQCB, 2000. General Waste Discharge Requirements for Temporary Groundwater Extraction and Similar Waste Discharges to San Diego Bay and Storm Drains or other conveyance systems tributary thereto. Order No. 2000-09; NPDES No. CAG91900.
- SDRWQCB, 2008. General Waste Discharge Requirements for Discharges from Groundwater Extraction and Similar Discharges to Surface Waters within the San

Diego Region except for San Diego Bay (WDR). Order No. R9-2008-0002, NPDES No. CAG919002.



## Regional Location

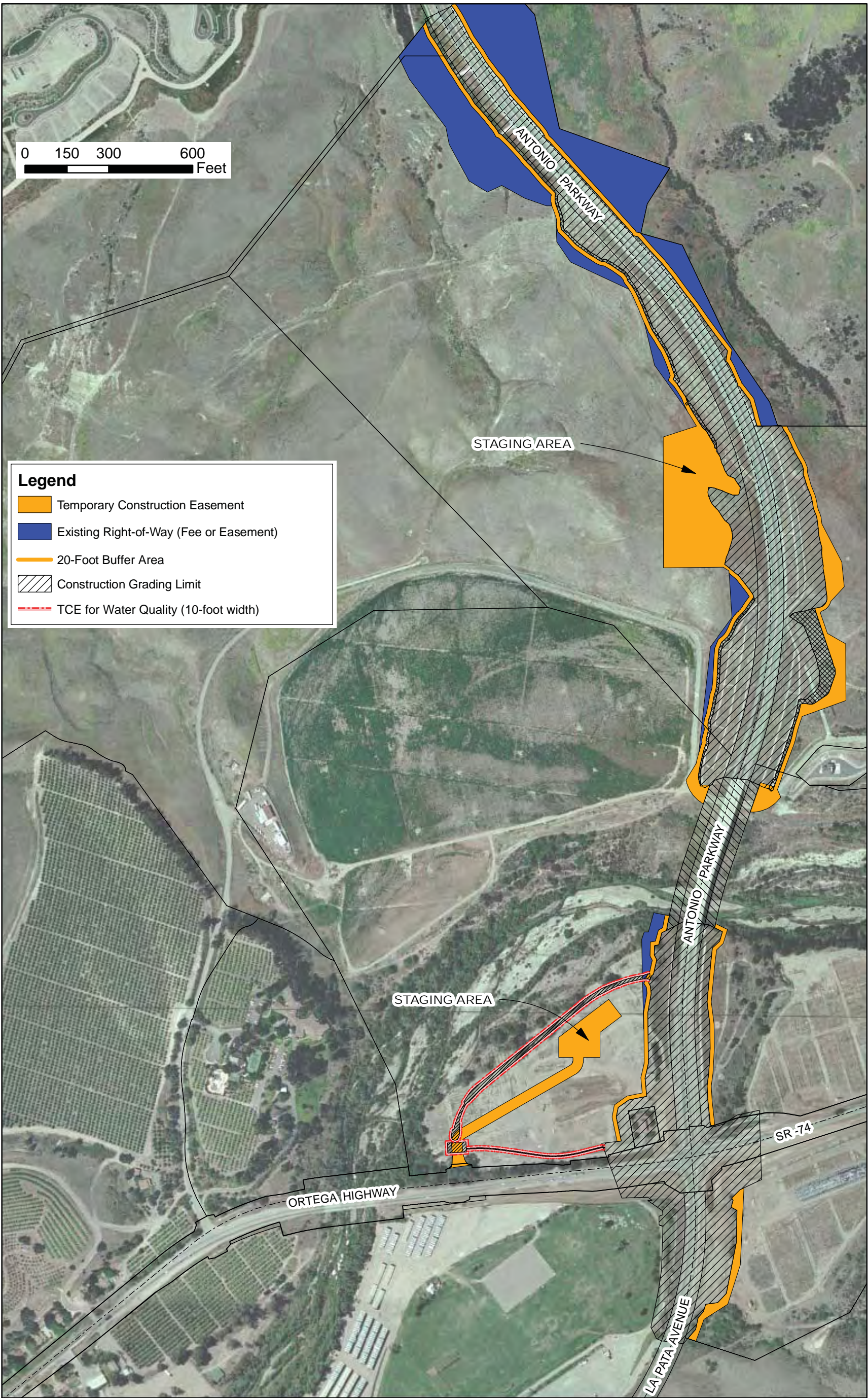
*Antonio Parkway Widening*



7 3.5 0 7 Miles

Figure 1.1





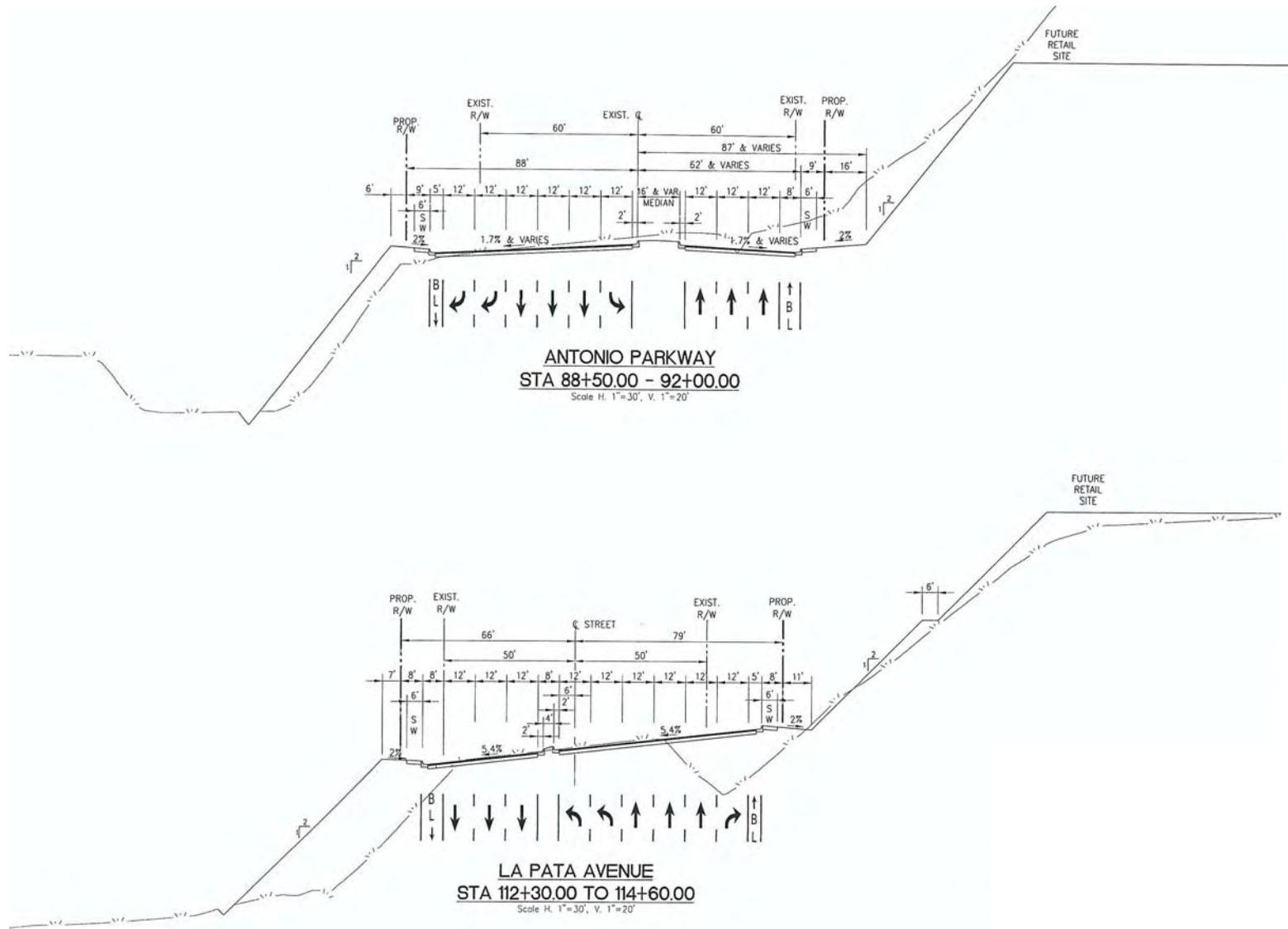
Project Footprint (Permanent and Temporary Impact Areas)

Figure 1-2

Antonio Parkway Widening

Source: Huitt Zollars 2009

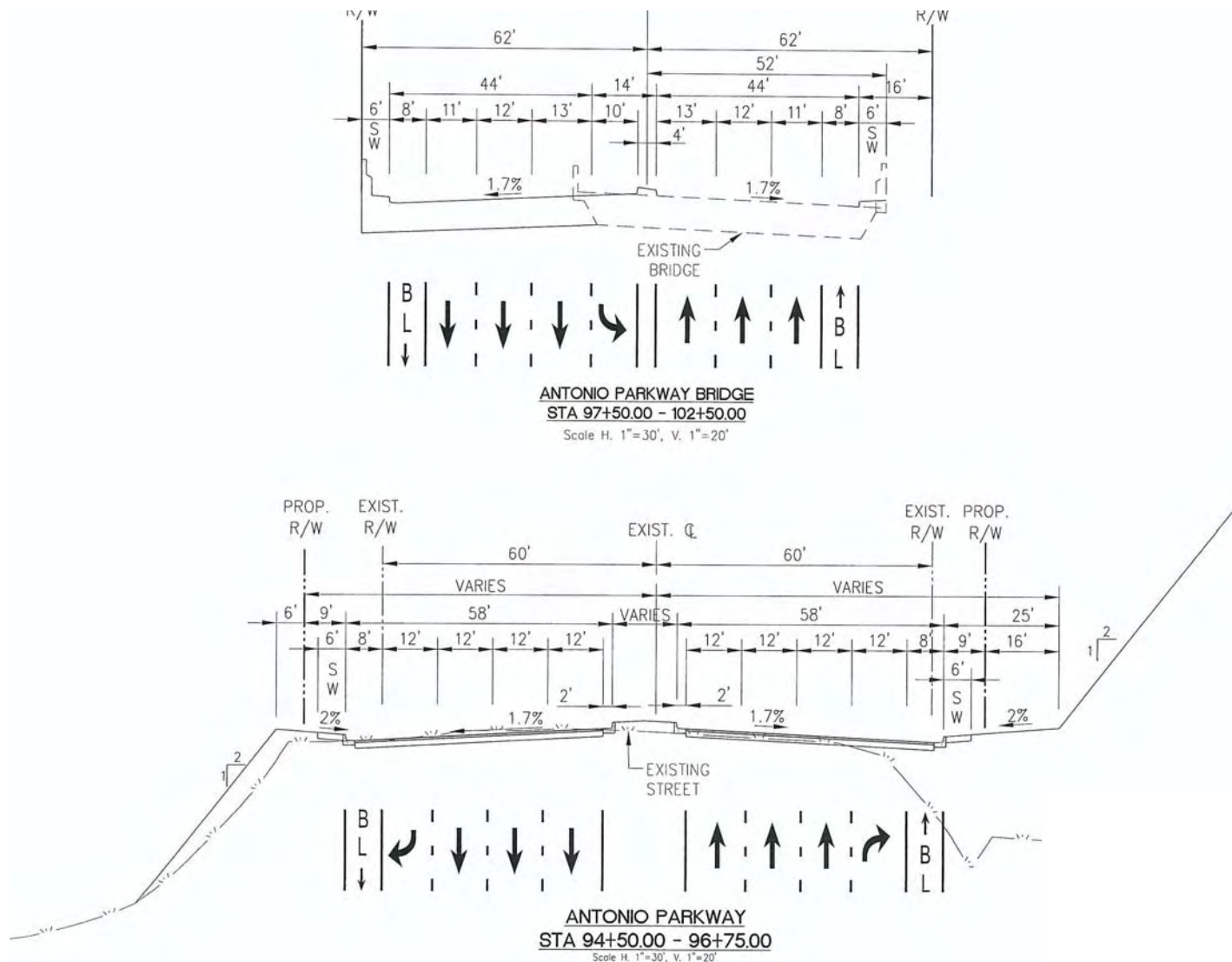




# Standard Cross Section

Antonio Parkway Widening

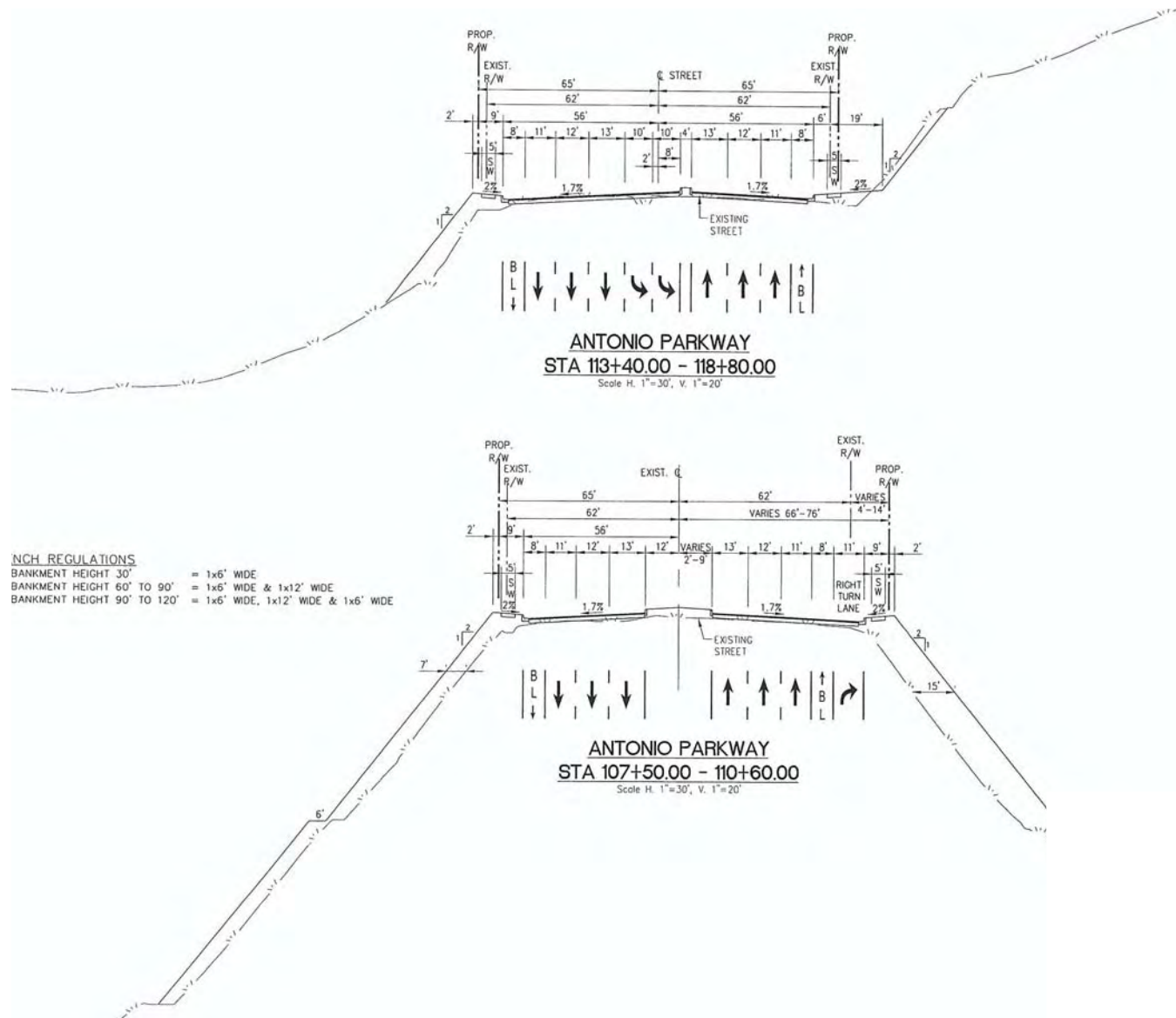
Figure1.3a



## Standard Cross Section

*Antonio Parkway Widening*

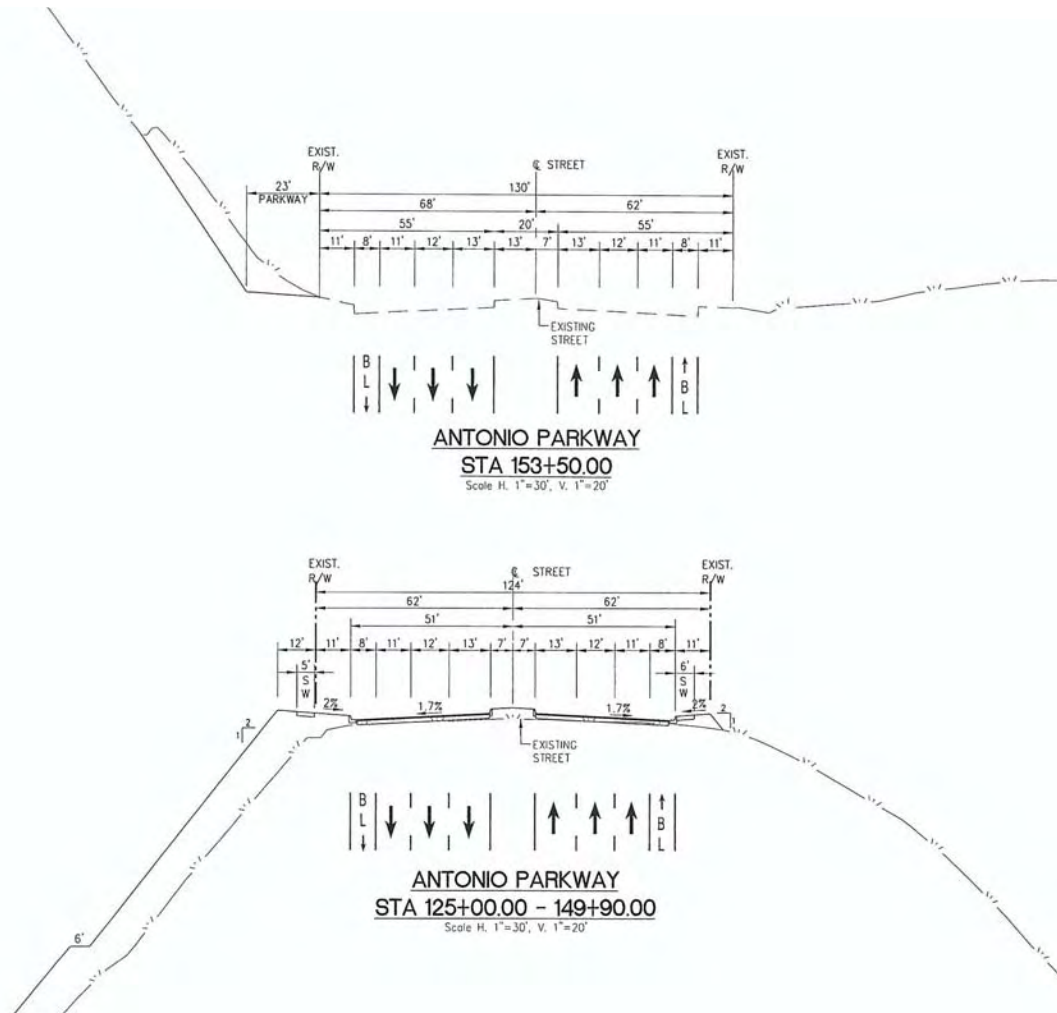
Figure1.3b



## Standard Cross Section

### Antonio Parkway Widening

Figure 1.3c

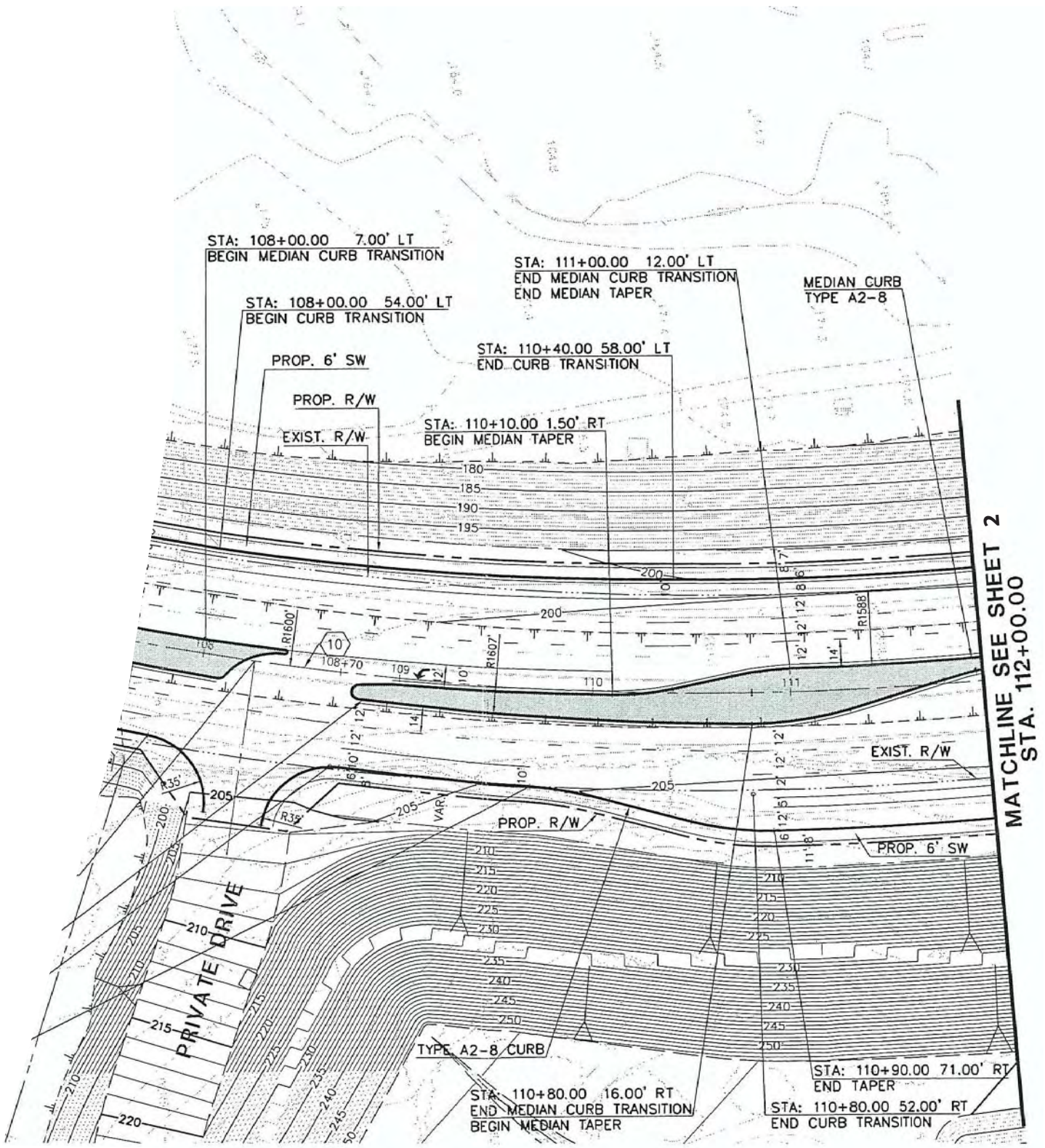
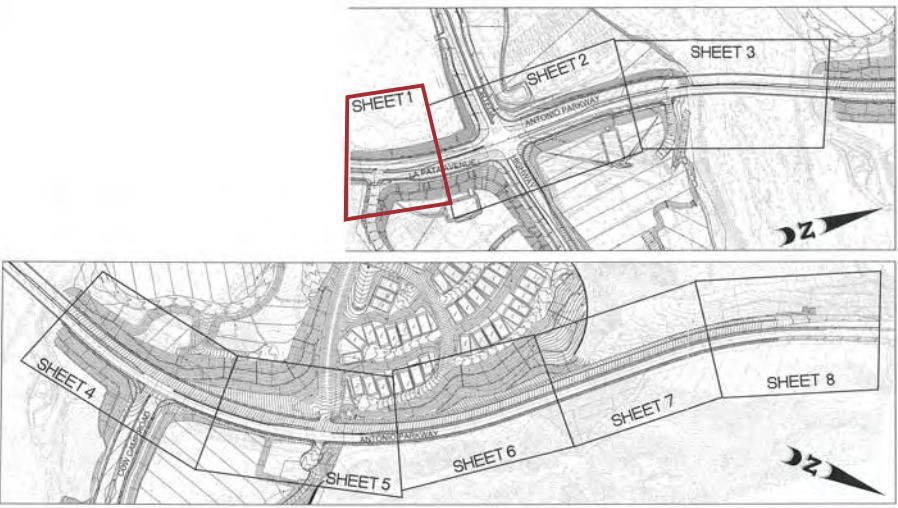


## Standard Cross Section

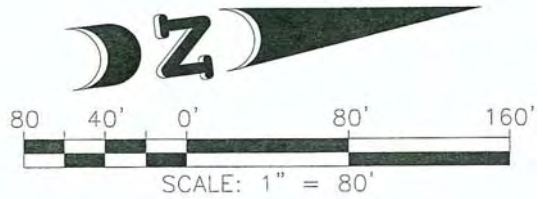
*Antonio Parkway Widening*

Figure1.3d





CL CURVE / LINE DATA				
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10	40°47'19"	1600.00	1139.03	594.85



Conceptual Project Plans

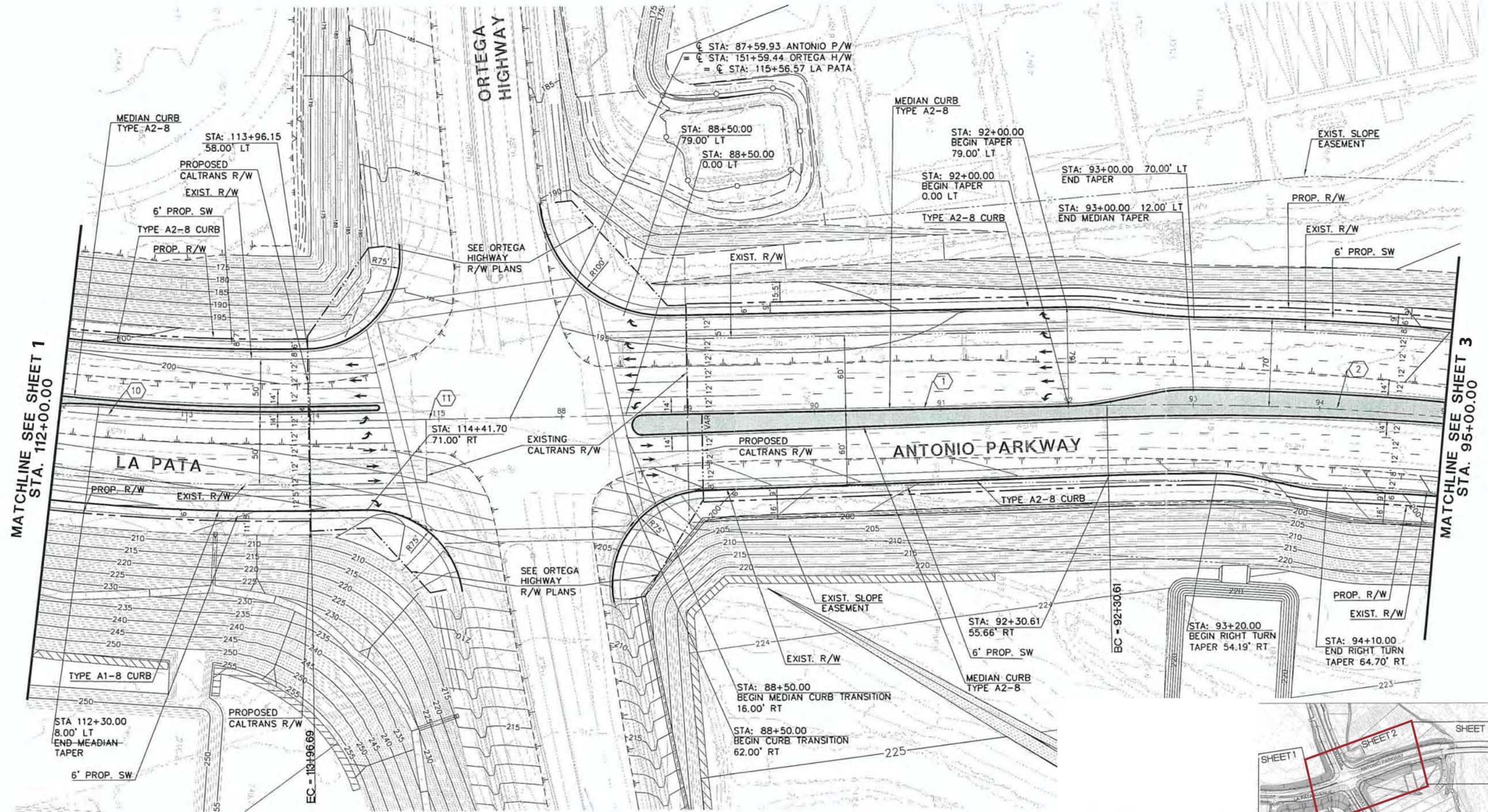
Antonio Parkway Widening

Figure1.4a

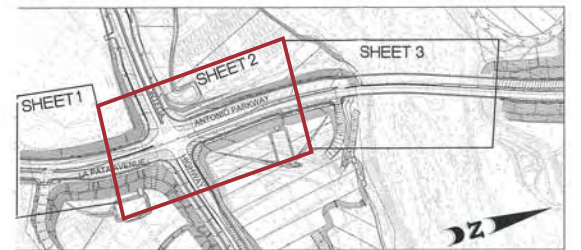
Source: Huitt Zollars 2008



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CL CURVE / LINE DATA				
NO	DELTA/BEARING	RADIUS	LENGTH	TANGENT
1	N04°43'20"W	-	470.68	-
2	23°53'57"	2350.00	980.23	497.35
10	40°47'19"	1600.00	1139.03	594.85
11	N04°43'20"W	-	159.89	-



## Conceptual Project Plans

Antonio Parkway Widening

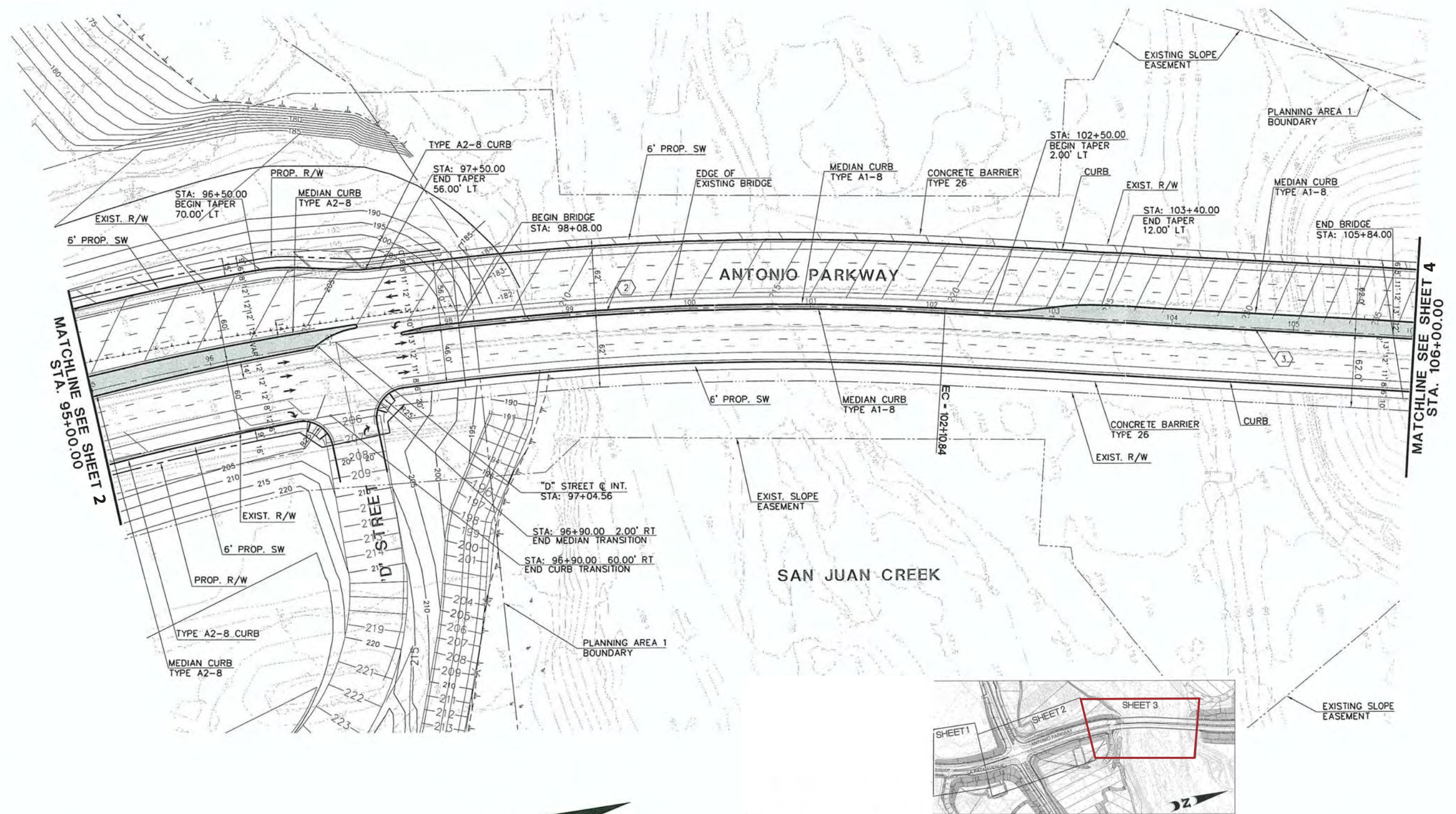
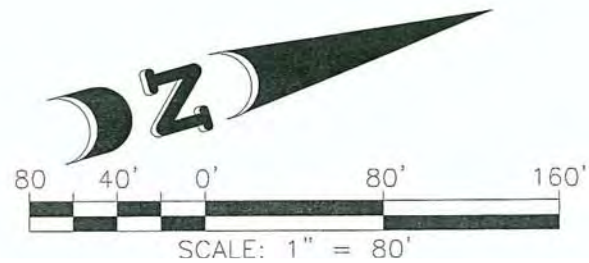
Source: Huitt Zollars 2008

Figure1.4b



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3	N19°10'37"E	-	495.07	-



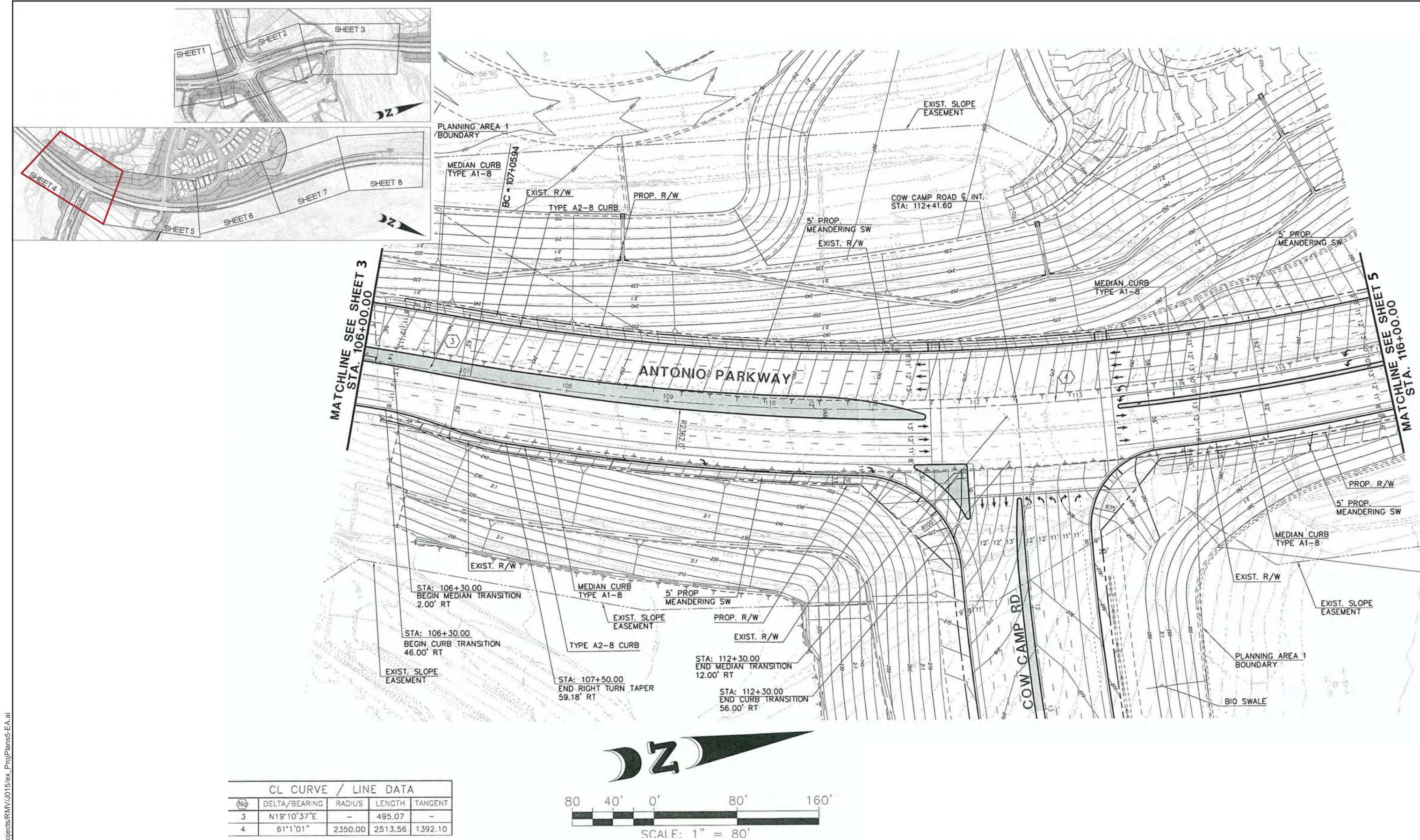
Conceptual Project Plans

Antonio Parkway Widening

Source: Huitt Zollars 2008

Figure1.4c





# Conceptual Project Plans

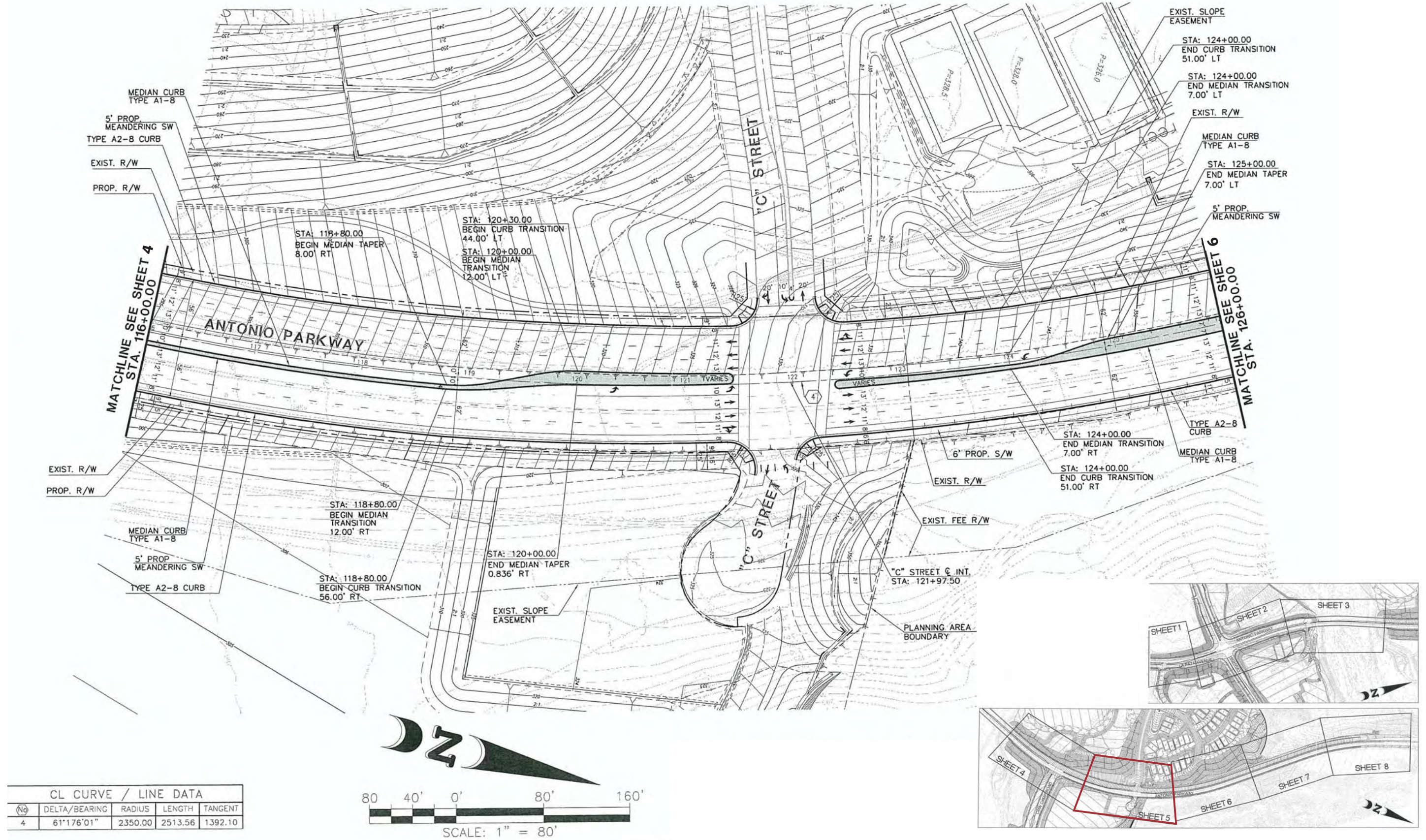
Antonio Parkway Widening

Source: Huitt Zollars 2008

Figure1.4d



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## Conceptual Project Plans

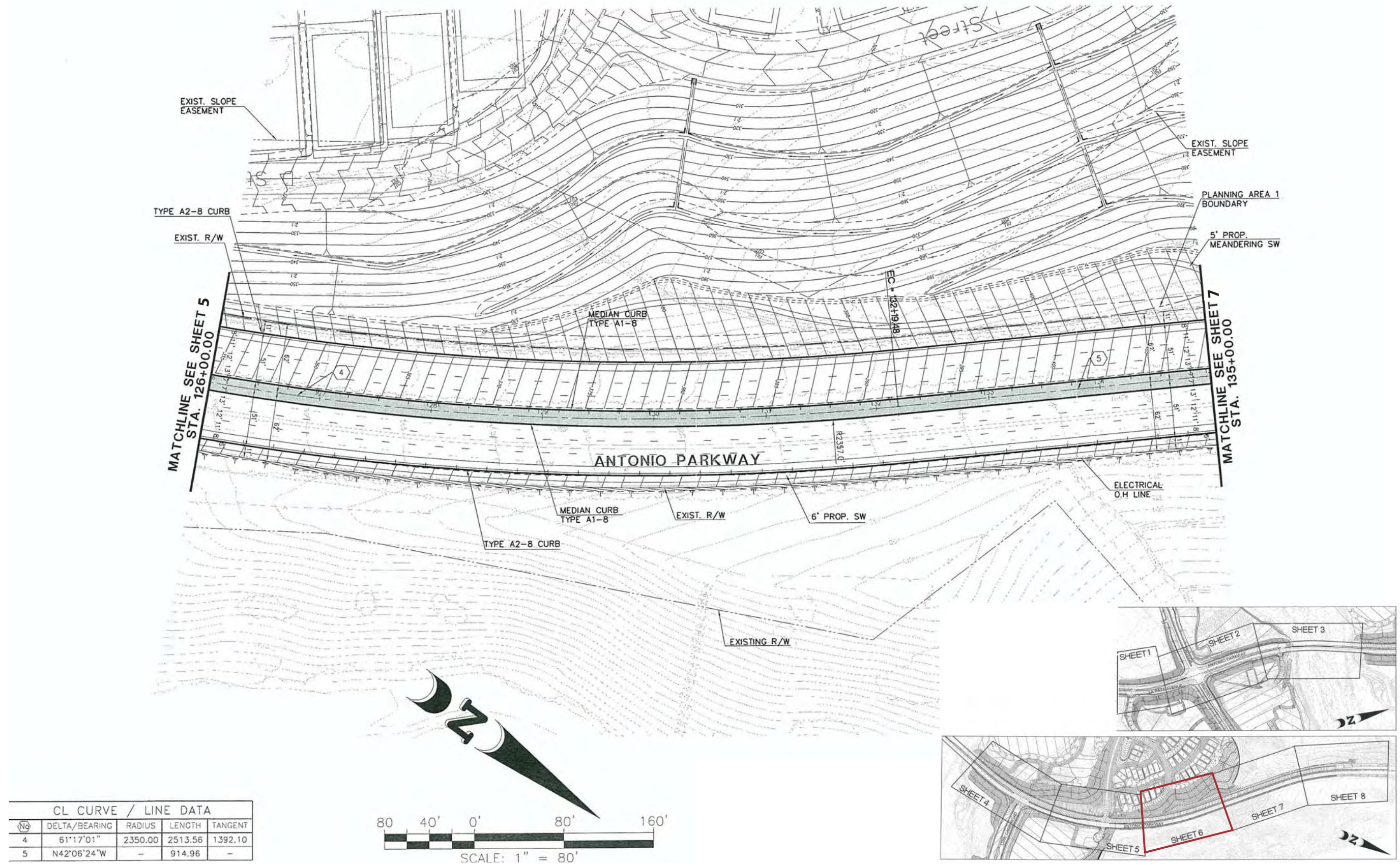
Antonio Parkway Widening

Source: Huitt Zollars 2008

Figure 1.4e



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Conceptual Project Plans

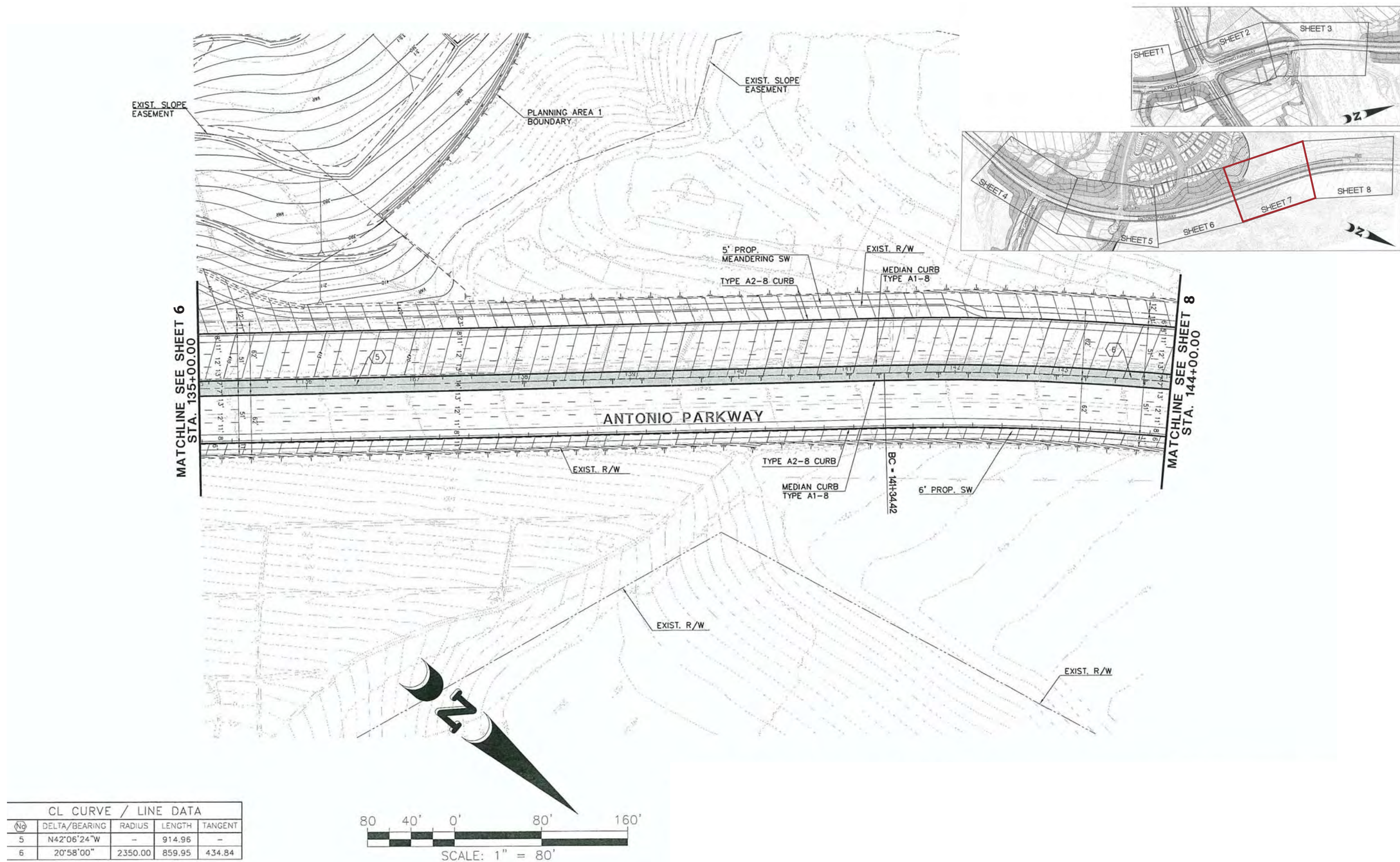
Antonio Parkway Widening

Source: Huitt Zollars 2008

Figure1.4f



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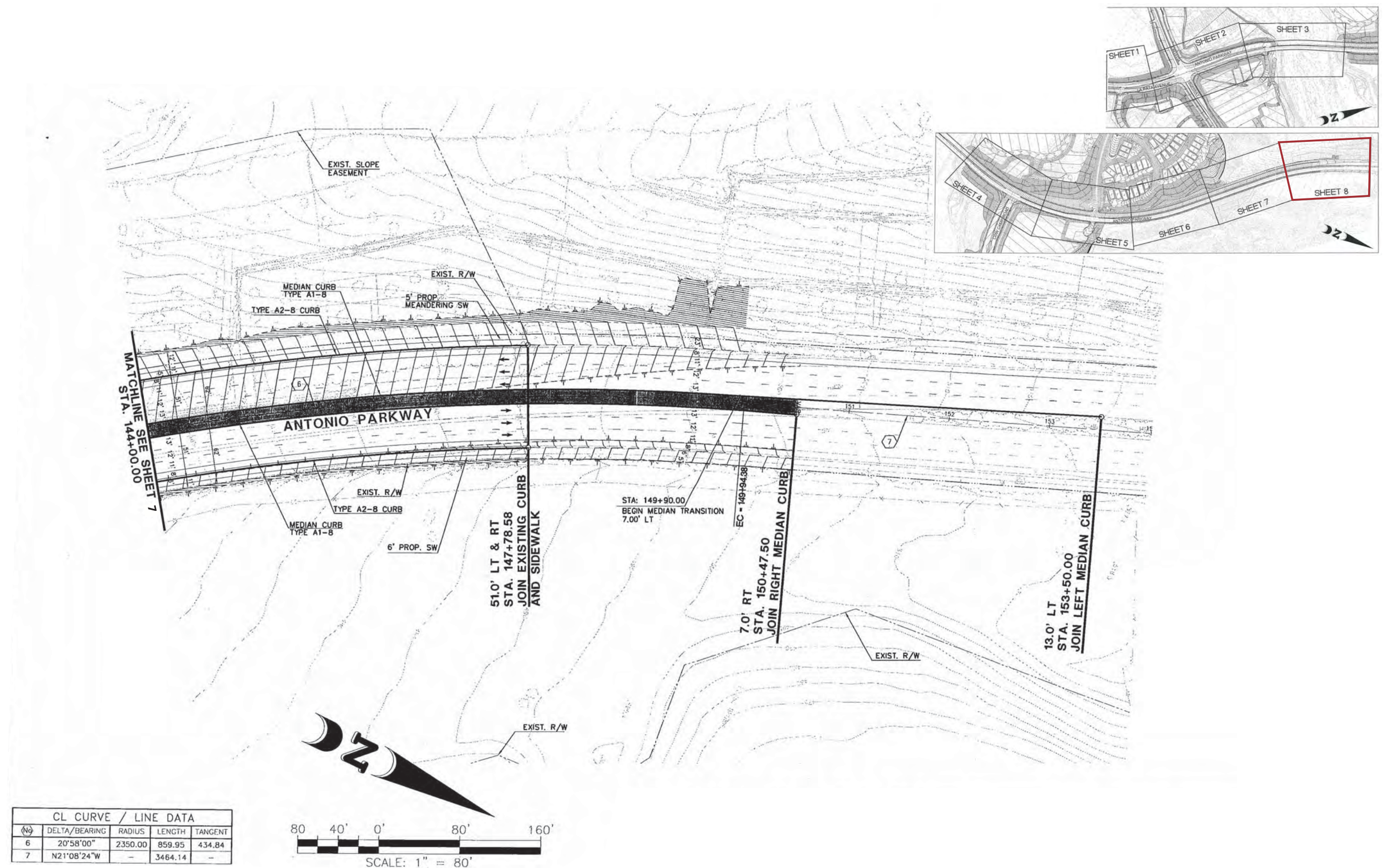
Conceptual Project Plans

Antonio Parkway Widening

Source: Huitt Zollars 2008

Figure1.4g





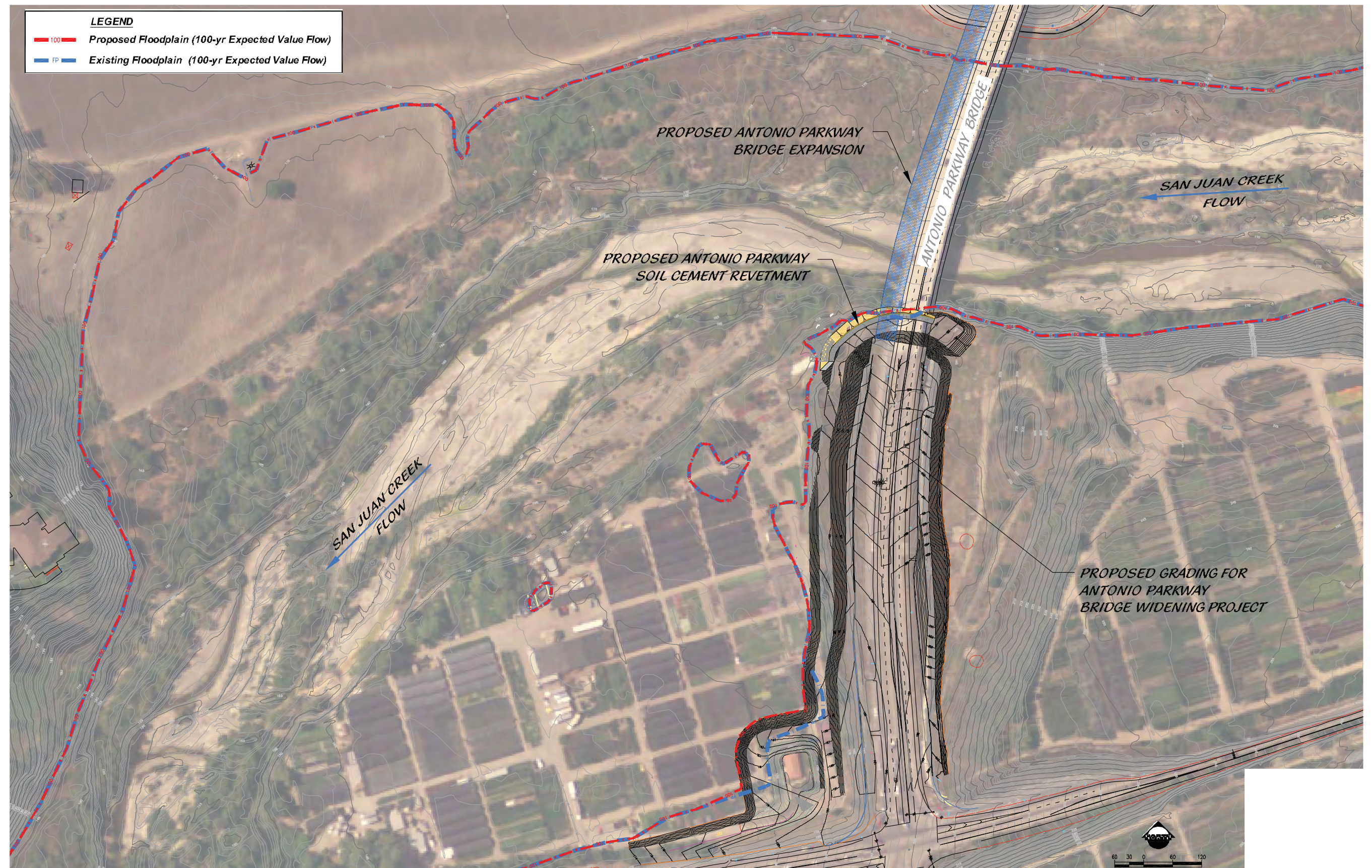
## Conceptual Project Plans

Antonio Parkway Widening

Source: Huitt-Zollars 2008

Figure1.4h



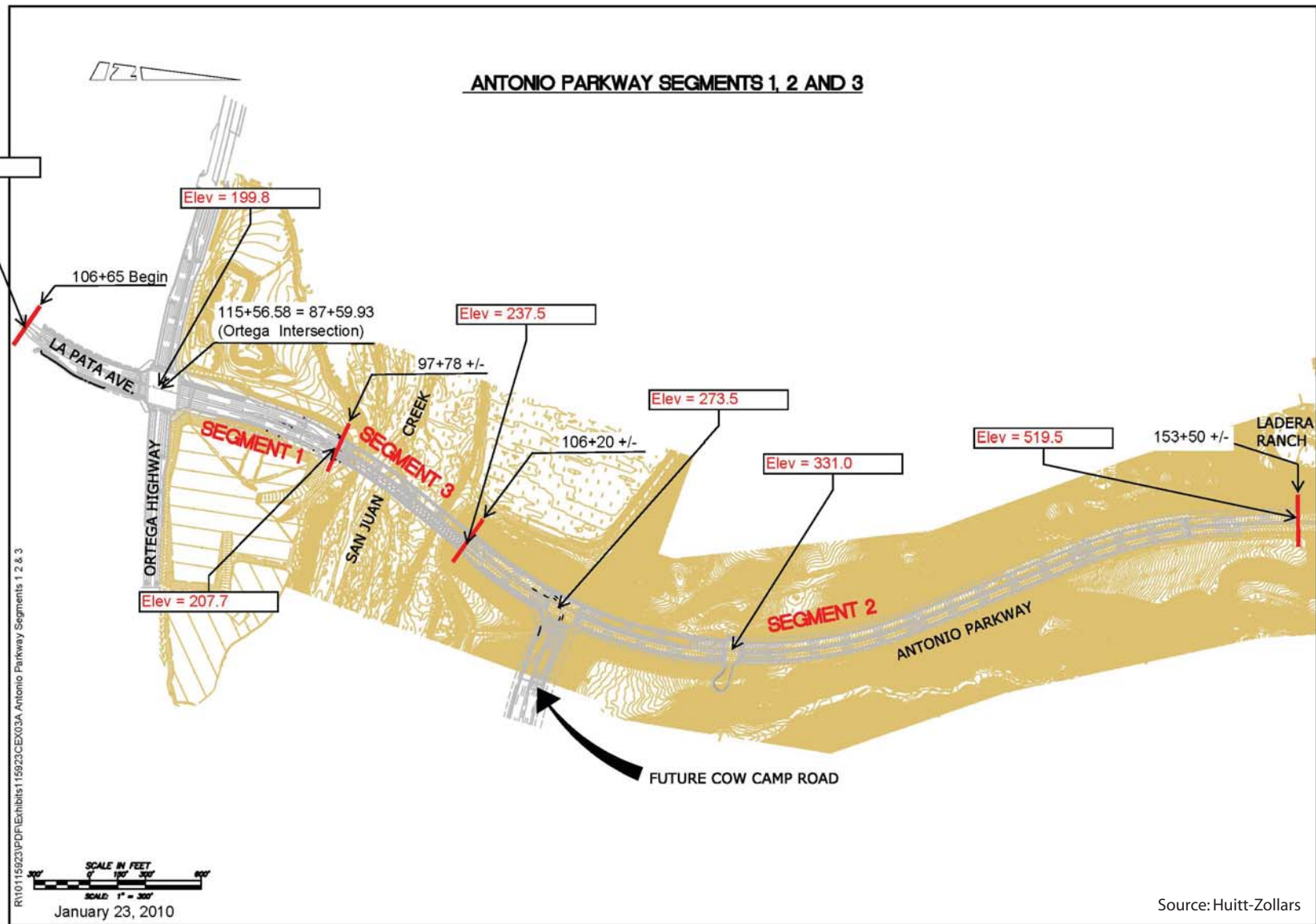


## 100-Year Floodplain

Antonio Parkway Widening

Figure 2.1

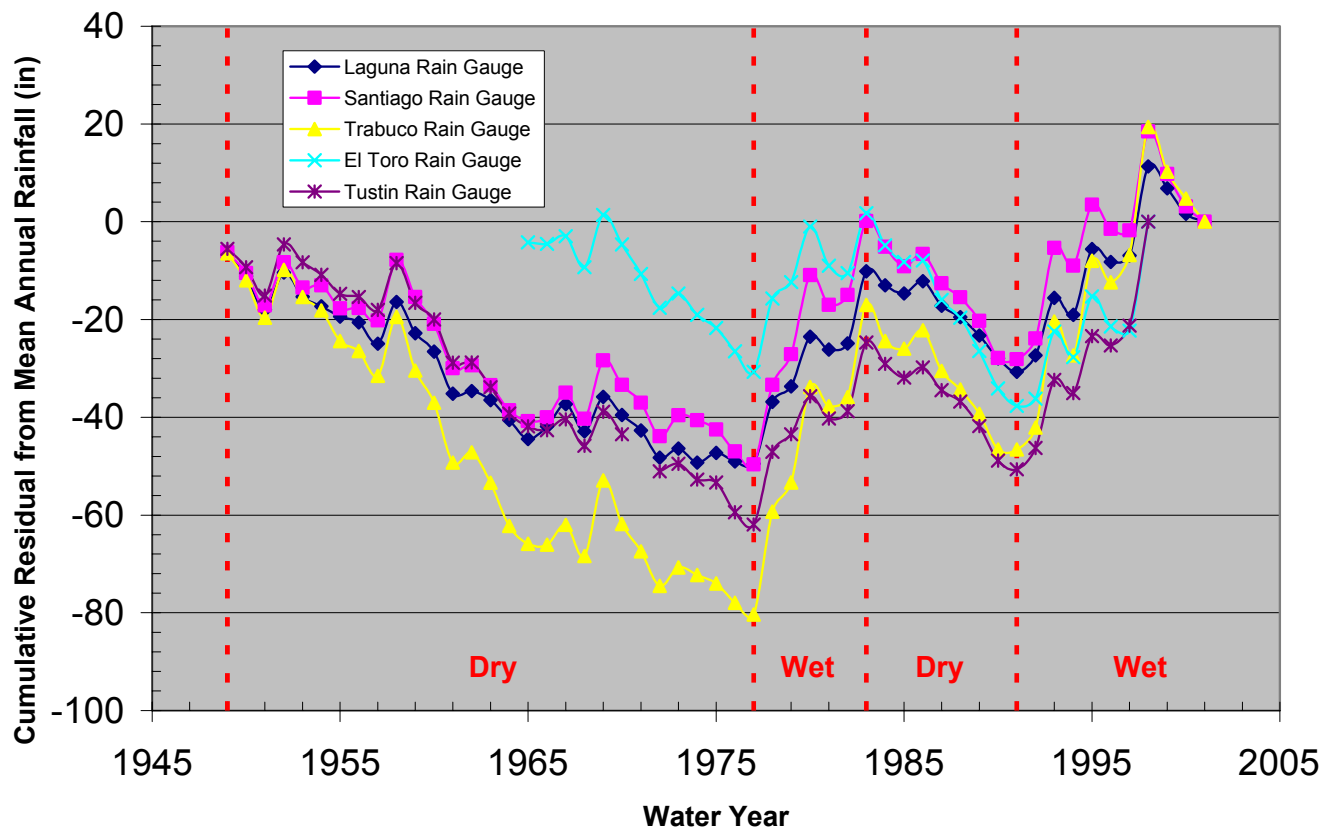




**Project Segments and Elevations**

*Antonio Parkway Widening*

**Figure 2-2**



Rain Gauge	Elevation (ft)	Mean annual rainfall (inches/ Water Year)	Median annual rainfall (inches/ Water Year)
Laguna	210	12.36	10.15
Santiago	855	14.43	11.86
Trabuco	970	18.68	15.02
El Toro	445	15.64	12.17
Tustin-Irvine	118	12.99	10.44

Source: GeoSyntec Consultants

**Figure 2.3**  
**Rainfall Wet and Dry Cycles**

**March 2010**

**Water Quality Assessment Report**



